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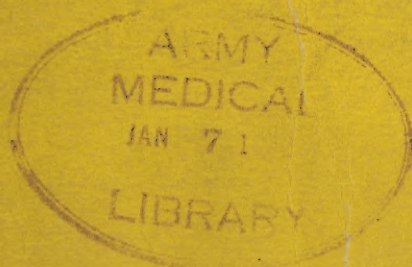


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September 1951

SYMPOSIUM

on
Military
Medicine
in the
Far East
Command



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THE SURGEON'S CIRCULAR LETTER, MEDICAL SECTION, GHQ, FEC, SCAP AND UNC

September 1951

SYMPOSIUM

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F O R E W O R D

The material which follows has been compiled by the Consultants to the Chief Surgeon and by many other officers of the Far East Command and of the United Nations Command. It is designed to acquaint officers of the Medical Service newly arriving in the theater with certain of the policies and practices which have been adopted since the outbreak of the Korean conflict.

The Korean campaign is in many respects unlike any heretofore waged by any of the United Nations. The climate of Korea is sub-tropical in summer and arctic in winter -- the coldest in which Americans have ever fought. Many diseases occur in Korea to a greater extent than elsewhere while the forbidding terrain, the highly infected soil, and the general distress of the population have combined to create a background for medical and surgical conditions without compare in the lands from which the soldiers of the score and more United Nations have come.

Despite all this, the first anniversary of the invasion of the Republic of Korea by Communists from north of the 38th parallel found the United Nations medical services singularly successful. Unlike any previous war in which American troops had participated, there has been, on our side, no epidemic of any disease against which we use prophylactic measures. The death rate in our military hospitals is the lowest ever recorded in war. Commanders of troops have, without exception, praised the efficiency of our evacuation of casualties from the front, entailing as it does able supervision and great physical courage, for our men are unarmed. All this has been achieved despite our inadequate personnel strength (less than half what we were entitled to have under Tables of Organization) when the enemy's unexpected attack took place, thereby necessitating the use of untrained men.

But the end is not yet and we cannot afford the luxury of lessening our efforts. Much remains to be done; this will be true even after actual fighting stops. Let us keep up the good work and hope to continue to merit the approbation of the Commander-in-Chief and other senior leaders of the United Nations Forces.

EDGAR ERSKINE HUME
Major General
Chief Surgeon, Far East Command
Medical Director General
of United Nations Forces in Korea

P R E F A C E

The need for a publication containing material of a technical and professional nature for the use of medical officers in this theater is obvious. Doctors arriving in the Far East Command are faced with new and strangely different problems not previously encountered in civilian practice at home. In this symposium the consultants to the Chief Surgeon, Far East Command and the United Nations Command have attempted to include only subjects of a professional nature. Space does not permit the inclusion of closely related operational and administrative information which can be found in the many directives, circulars, etc., issued from time to time. This symposium is, in no sense, intended as a textbook but we hope that it will prove to be a useful guide and a ready reference for medical officers in the Far East Command.

We desire to express our deep appreciation to the many contributors to this symposium representing the medical services of the Army, Navy and Air Force as well as expert civilian consultants. Their rich experiences in this theater, and in many instances in the late world war, eminently qualify them to speak with authority in their particular fields.

Grateful acknowledgement is also made to secretaries, typists, and to the many others in the Medical Section whose help and cooperation contributed much to the final preparation of this symposium for publication.

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Preventive Medicine

The section on Preventive Medicine in this symposium does not purport to present in detail the numerous procedures and mechanisms to be applied in the Far East Command for the maintenance of the health of the troops. Rather, the purpose of this section is to sketch roughly the basis of good preventive medicine practice in this area. It is hoped that the material presented here will aid the medical officer to appreciate the principal health problems present and assist him in the wise and timely application of appropriate preventive and control measures.

In the field of preventive medicine as in other branches of medical endeavor there tends to be a gap between basic knowledge and successfully applied techniques. This gap will be closed only when all medical officers practice good preventive medicine and when through this practice command becomes well indoctrinated in disease prevention and the individual soldier has the knowledge and will to protect his health and that of his fellows.

ARTHUR P. LONG
Colonel MC
Preventive Medicine Consultant, GHQ, FEC

RESUME OF PROBLEMS AND PRACTICE IN PREVENTIVE MEDICINE, FAR EAST COMMAND
Colonel Arthur P. Long, Preventive Medicine Consultant, GHQ, FEC

The maintenance of the health and physical and mental effectiveness of the Armed Forces is the goal of military medicine. An important approach to the achievement of this goal is the prompt and effective treatment of disease and injury and the early return of the patients to normal activities. The other and more positive approach is through the prevention of the occurrence of disease and injuries. This latter approach is the function and purpose of military preventive medicine. The practice of good preventive medicine requires knowledge of potential health hazards, information as to where, when and under what conditions diseases are occurring and the energetic application of sound preventive and control measures. It is the purpose of this resume to review briefly the principal disease problems in the Far East Command, to recount in a few words the principal experiences with these diseases during the past year or so, and to present a few of the most significant basic concepts for individual and group disease prevention.

The basic disease problems arising in the Far East Command are not significantly unlike those experienced in the various parts of the United States, the difference frequently being quantitative rather than qualitative. Thus the procedures applicable for dis-

ease prevention at home are also to be applied in the Far Eastern areas, the principal difference in their application being the increased vigor and attention that are frequently required. In addition to these basic health problems demanding constant attention, there are certain conditions and disease hazards which, though not necessarily unique to the Far East, differ from those seen in the United States, hence offer new experiences in prevention and management of disease to the American trained physician. Accordingly, here an attempt will be made to emphasize those medical problems of particular significance in the FEC.

RESPIRATORY INFECTIONS: (See page 11)

Since the beginning of the occupation, infections of the respiratory tract have occurred with a somewhat higher frequency in some sections of the Far East Command than in many world areas where our troops are deployed. This has been particularly true in Japan and Korea. Common respiratory disease here, as elsewhere, has been the leading cause for illness in this group. Influenza A, A prime and B have been demonstrated in Japan and isolated cases of influenza A prime were recognized in Korea last winter. Not since the 1946-47 season, however, have these infections oc-

curred with a significantly high frequency. During the early years of the occupation, streptococcal respiratory tract infections, followed by rheumatic fever, presented a considerable problem principally in Japan and Korea. The incidence of the pneumonias has not been great. During the year just passed, the so-called atypical or virus type of pneumonia and that resulting from bacterial causes were of essentially equal frequency.

There are almost no special procedures or practices offered for the specific control of the respiratory group of diseases. It is worthwhile, however, to continue to emphasize the time honored non-specific means for the prevention of dissemination of these infections such as avoidance of overcrowding, covering of sneezes and coughs, avoidance of overfatigue, wearing of proper clothing, and early detection, segregation and treatment of the more serious cases. Because of the demonstrated presence of influenza A prime in Japan and Korea, early in 1951, the polivalent influenza vaccine, made available by The Surgeon General, was administered to troops in these areas. No true epidemic developed. The effect of the vaccine in this situation is unknown. Chemoprophylaxis such as that attempted during the latter part of World War II for the prevention of streptococcal infections has not been applied in the Far East Command and is considered undesirable.

DIARRHEAL DISEASES: (See page 37)

This group of disorders which includes common diarrhea, dysentery, both bacillary and amebic, Salmonella infections and bacterial food poisoning, were remarkable infrequent causes of disability prior to the Korean operation. In Korea, however, the generally insanitary environment, the difficulty of maintaining good personal hygiene, and the many problems surrounding the establishment and enforcement of effective sanitary practices have resulted in the diarrheal diseases being one of the major health problems particularly during the hot months. The common diarrheas have led the incidence, with Shigella infections second in importance. Amebic dysentery has thus far been of relatively little importance but there are some indications that it may occur with a higher relative frequency this year than last. In Japan bacillary dysentery is becoming more and more of a threat with a marked increase in incidence being experienced among the native population. (Bacillary dysentery principally *Shigella flexneri* infections were twice as frequent in this population as in 1949 and at the end of the first six months in 1951 there are indications that the occurrence of these infections will at least treble that of last year.) These diseases have in the past presented certain problems in Okinawa, but thus far in 1951 the record shows considerable improvement over the similar period for 1950.

With this group of infections as with the respiratory diseases, there are no specific control procedures available. The prevention and control of these infections then rests upon continued emphasis and application of individual and group sanitary and hygienic precautions aimed at breaking the chain of transmission of pathogenic enteric micro-organisms. Early recognition and treatment of the various specific infections in this group is an important measure not only for reducing morbidity but also for shortening the acute and convalescent carrier periods and decreasing the transmission potential. In this connection it is to be borne in mind that person to person spread of these diseases is an extremely im-

portant mode of continuation and build-up of their incidence.

TYPHOID FEVER:

This once highly significant disease of armies in the field has occurred only rarely in the Far East Command in recent years. In fact less than half a dozen cases were reported last year. Improvement of sanitary practices including the furnishing of safe drinking water and the enforcement of water discipline plus vaccination must be continued to maintain this favorable situation.

CHOLERA:

This highly fatal disease is always a potential hazard in the Orient. No cases have occurred thus far among American troops and as far as is known there have been none among enemy forces in Korea. Basic vaccination plus the administration of stimulating doses of vaccine at appropriate intervals serve as an adjunct to general and individual sanitary and hygienic practices for the prevention and control of cholera.

INFECTIOUS HEPATITIS: (See page 23)

This disease is of considerable military importance because of the length of its clinical course and period of convalescence. Prior to our taking the field in Korea, the incidence of hepatitis among American forces in the Far East Command remained at relatively low levels. Beginning in November 1950, however, infectious hepatitis began to appear with increasing frequency among troops in Korea. The incidence reached its peak during the early part of 1951, receding only in the late spring months. The great majority of cases are believed to have been the result of I H (infectious hepatitis) rather than S H (serum hepatitis) type virus. The true mode or modes of transmission of this infection are not known, but transmission in the same manner as the enteric infections is the mechanism most commonly accepted as the important one. Again there is considerable evidence that person to person spread is important. With the widespread occurrence of the virus, artificial transmission by contaminated syringes and needles cannot be ignored and all possible precautions should be taken to prevent spread in this manner. Individual, heat sterilized (boiling 15 minutes or the equivalent autoclaving) syringes and needles are a must for intra-muscular injections. The minimum precautions for subcutaneous injections include the use of individual needles sterilized by boiling for 15 minutes or the equivalent. Whenever it is possible to do so, subcutaneous injections should be accomplished by the use of individually heat sterilized syringes and needles prepared in the same manner as for intra-muscular injections.

MALARIA: (See page 24)

Malaria is the most important of the insect-borne diseases experienced by American troops in the Far East Command, at least from the point of view of numbers of cases. This disease was quite well controlled prior to the Korean operation, the main centers of incidence previously having been in Okinawa and the Philippines where less than 20 cases were reported in 1950. Under conditions present in Korea, an increase in incidence there was inevitable during the summer of that year. Even so, only about 500 cases were reported. (This does not take into consideration the considerable number of fevers of un-

determined origin, a significant portion of which may have been malaria.) The only type of malaria recognized thus far in Korea has been vivax or tertian, a fairly benign disease but one in which remissions are not uncommon. The mosquito vector is Anopheles hyrcanus sinensis, a rice paddy breeder. This is also the vector found in Okinawa. In the Philippines Anopheles minimus, a stream breeder, is the principal vector.

Prevention of malaria, of course, lies principally with adequate mosquito control. This entails area and unit control of breeding and adult killing, plus individual protective measures such as the use of repellents, sleeping nets, proper clothing, etc. In Korea in order to maintain the highest degree of effectiveness at all times, suppressive medication is also used. For this, chloroquine diphosphate, one tablet (0.5 grams) is administered to all personnel once a week. For the sake of uniformity this drug is given each Sunday. While it is the responsibility of appropriate commanders to enforce this discipline, it is the duty of the medical officer to stress its importance and to check on the completeness of the program. It must be remembered, of course, that chloroquine is a suppressive drug only and not a true causal prophylactic. Hence, a certain number of breakthroughs after cessation of the drug may be expected. The suppressive program is continued in hospitals in Japan for all casualties from Korea until they are evacuated to the ZI or returned to their units where, of course, it is carried on.

ENCEPHALITIS:

An insect-borne disease probably unique to the Far East is Japanese B encephalitis. This infection is a member of the large mosaic of virus encephalitides and for practical purposes it is clinically indistinguishable from the others. It is found in Korea, Okinawa and Japan, where during the 1950 season 300, 16 and 30 cases were reported respectively among American forces. The case fatality rate is in the neighborhood of 10% and severe central nervous system residuals are relatively uncommon.

As indicated previously, Japanese B encephalitis is believed to be an insect-borne disease transmitted by Culex mosquitoes, Culex tritaeniorhynchus being the vector most commonly blamed, though others have been incriminated. The reservoir host is probably in the native population of the areas, the members of which possess a high degree of immunity in adulthood. Domestic animals are also possible hosts. The season of highest incidence is in late summer in Okinawa and Japan and possibly somewhat later in Korea. In 1950 the disease there began in late August and continued into October.

Mosquito control offers the best means for prevention, but under conditions as they exist in the areas concerned, this is difficult to achieve to the desired extent. As an adjunct, Japanese B encephalitis vaccine is administered to all U. S. troops in Korea, Japan and Okinawa. This procedure is as yet of unproven value, but evidence gathered in the past has indicated a likelihood of some degree of protection. Studies carried out in 1950 failed to elicit convincing evidence in either direction.

TYPHUS FEVER:

Classical or epidemic, louse-borne typhus fever has for many years been endemic and at times epidemic in parts of the Far East including Japan and Korea. In

Japan there has been no serious outbreaks since 1945-46 while in Korea significant epidemics have continued to occur among the native population. The disease may have been of considerable importance among enemy troops there last winter, but the extent of the damage it created is unknown. No proven cases have been reported from Americans or other UN forces to date. (The ROK troops experienced a scattering incidence last winter.)

The prevention and control of typhus depends principally upon the prevention and control of lousiness, a problem presenting some difficulty in the cold weather at which time the disease tends to appear. (It is of some interest that typhus in Korea has its highest occurrence in the late winter and early spring months frequently reaching its peak as late as May.) Strict attention to hygienic measures, insistence on bathing as frequently as possible with the provision of changes of clothing, and the application of insecticides prophylactically are the mainstays of the typhus control program. As an added safeguard, typhus vaccine is administered routinely to all U. S. troops with booster doses as the situation warrants.

SCRUB TYPHUS (TSUTSUGAMUSHI DISEASE):

This member of the typhus group of rickettsial infections has its home in Japan and as far as is known it is not found in other parts of the Far East where American forces are now located. It is transmitted by the bite of a Trombicula or mite found in the grass or brushy undergrowth of certain usually sparsely populated areas. The traditional sites of this disease are in the northwestern part of Japan in Akita, Yamagata and Niigata Prefectures. In 1948 a new area was discovered by American troops on maneuvers in the vicinity of Mt. Fuji. This discovery was made through the occurrence of some 25 cases in October of that year.

Protection from the bites of infected mites is the key to the prevention of this disease. This is accomplished by the application of miticidal solutions to the outside clothing. The material used for this purpose is an emulsion of dibutyl phthalate, benzyl benzoate and an emulsifying agent. Standard mosquito repellent is also an effective miticide but is somewhat more transient in effect than is the aforementioned combination. The vaccine used for protection against epidemic louse-borne typhus fever is of no value in the prevention of scrub typhus.

RELAPSING FEVER:

Relapsing fever, caused by a spirochete, Borrelia recurrentis, is a louse-borne disease encountered in Korea. (This infection is tick borne in various parts of the world but as far as is known at this time, ticks have played no part in the transmission of this disease to our troops in Korea.) The occurrence of some two score cases of this febrile illness among our forces indicates that louse infestation has not been completely controlled during the last year. The prevention and control of relapsing fever depends on freedom from lice of those at risk. Hence, the same procedures applicable to typhus prevention are indicated. There is no artificial immunization procedure available. The occurrence of a case of relapsing fever in a military organization clearly indicates the presence of louse infestation in that organization. Accordingly, it is incumbent upon the medical officers concerned to report this situa-

tion to the responsible commander, at the same time presenting suitable recommendations for action to be taken to effect louse control.

SMALLPOX (See page 20)

Since the early days of the occupation, smallpox has been a continued threat to U. S. troops in Japan and Korea. During more recent years this disease has become well controlled in Japan but has continued to occur in a highly virulent form in Korea, frequently in epidemic proportions in the native population. During the first 12 months of the Korean campaign, there have occurred some 40 cases of smallpox among UN forces other than ROKA. Of these, about 30 were in American personnel. These cases do not suggest failure of American vaccine to protect. Rather they indicate clearly the failure of the proper administration of this vaccine. In short, they represent failures in the performance and interpretation of the vaccination procedure. Vaccination with American vaccine will prevent even the severe type of smallpox seen in the Orient, but the vaccination must be properly done. This is accomplished by the use of potent vaccine, insured by shipment and storage under proper conditions and use within the stated expiration date; satisfactory vaccination accomplished by proper preparation of the vaccination area and correctly executed multiple pressure method; proper interpretation of the vaccination result and recording of same, and repetition of all unsuccessful vaccinations until a successful reaction is produced. Elsewhere in the symposium a discussion of the proper procedures for smallpox vaccination is presented. It should be studied carefully by all medical officers so that each may properly discharge his responsibilities in the prevention of this disease.

VENEREAL DISEASES: (See page 48)

As with many other infectious diseases present in the Far East, the venereal diseases differ from those seen in the United States chiefly in a quantitative rather than a qualitative manner. Gonorrhea is the most common, chancroid occurs with second highest frequency and syphilis is much less frequently encountered. Others in the venereal disease group such as lymphogranuloma venereum and granuloma inguinale are rarely seen. The high incidence of the venereal infections reported from troops in Japan, Okinawa and Korea may be attributed largely to the following factors:

- a. High proportion of very young men in new and unusual environments.
- b. Legality of prostitution in these areas.
- c. The extremely high infectious rates among available consorts with whom troops can easily establish contact.
- d. Little effective reduction of the civilian infectious reservoir.
- e. The extreme difficulty in identification of contacts.
- f. Complete faith on the part of troops in modern therapy.
- g. Relatively high degree of reporting as compared to areas where civil medical attention is more readily obtainable.

It may be expected that should hostilities cease in Korea, the incidence of venereal diseases among troops there will increase considerably.

A high incidence of any disease, including those of venereal origin, is unsatisfactory. However, it is

to be emphasized that from a military point of view at least, the importance of a disease lies in large part in the degree of disability it produces and in the resultant non-effectiveness. With modern ambulatory treatment of the venereal diseases, very little time is lost from duty and the disability which results is negligible. It is, therefore, of the utmost importance that early detection with prompt adequate therapy be continually stressed. It is the untreated and neglected case that tends to become complicated and results in non-effectiveness.

For the prevention of these infections chief reliance must be placed on the reduction of unprotected exposures to infected sources. This requires continued education of troops against promiscuous sexual exposures and training in personal prophylaxis including chemical and mechanical measures. The chemical prophylactic kit is a standard supply item and available for general distribution. Mechanical prophylactics are not items of general issue but in the Far East Command may and should be purchased from PX or other sources with unit funds and made readily available to personnel on their request. The ready availability of these items plus careful indoctrination in their proper use will assist materially in reducing the incidence of the venereal infections.

The use of penicillin orally or parenterally for the prevention of venereal infections has received considerable publicity in recent times. This procedure, while applicable in certain situations, is not to be applied generally in the Far East Command. It is to be utilized only upon authority of a major command surgeon and with the concurrence of the Chief Surgeon, Far East Command.

COLD INJURIES: (See page 47)

During the cold months (November through March) of the Korean campaign, U.S. forces suffered some 5,000 cases of cold injuries. These injuries were chiefly of the extremities with the feet primarily affected. The great majority were the result of true frostbite following exposure to severe cold. Only a moderate number of cases were encountered which resulted from longtime exposure to wet, moderately cold conditions. These cold injuries occurred despite an intensive preventive program effected co-operatively by the medical services, QM services and the various echelons of the command. Without this program, it is felt that many more cases would have been encountered.

The prevention of cold injuries is based on the triad of adequate cold weather clothing and equipment, proper indoctrination and training in the use of this equipment and individual preventive measures, and unceasing command supervision and enforcement of cold weather discipline. The prevention of cold injuries then is of necessity a command responsibility. The medical officer, however, also occupies an important place in the preventive program. It is he who must point out to the responsible commanders the conditions and situations under which cold injuries occur. He must also emphasize continually the importance and possible end results of such injuries not only as they affect individuals, but also in terms of loss of effectiveness of the organization. In addition, since the occurrence of cold injuries as well as any other injury or disease are first seen by the medical service, it is the medical officer's responsibility to report the occurrence of the condition to the responsible commander in order that he may take the steps necessary to effect the maximum degree of prevention.

PARASITIC DISEASES: (See page 14)

Elsewhere in the symposium is a discussion of schistosomiasis, filariasis, Paragonimiasis and other parasitic diseases in the Far East.

SELECTED GENERAL REFERENCES:

- AR 40-210: Prevention and Control of Communicable Diseases of Man.
- AR 40-215: Immunization Register and Other Medical Data
- AR 40-205: Military Hygiene and Sanitation
- AR 615-250: Enlisted Men, Physical Inspection
- FM 21-10: Military Sanitation

The Control of Communicable Diseases in Man - An Official Report of the American Public Health Association.

TB MEDs

The following are those considered to be of special interest in the practice of Preventive Medicine:

AMEBIASIS - Amebiasis. TB MED 159, May 45, C-1, 21 Nov 47. Water Treatment in Areas Where Amebiasis and Schistosomiasis are Hazards, TB MED 190, Aug 45

CHOLERA - Cholera. TB MED 138, Feb 45

DIPHTHERIA - Cutaneous Diphtheria. TB MED 143, Feb 45, C-1, 4 Feb 47

DISINFESTATION - Disinfestation Procedures. TB MED 184, Jul 45

DYSENTERY - Bacillary Dysentery. TB MED 119, Nov 44

ENCEPHALITIS - Japanese B encephalitis. TB MED 181, 6 Apr 47

HEAT - Prevention and Treatment of Adverse Effects

of Heat. TB MED 175, June 45 and C-1, 25 Nov 46

HEPATITIS - Infectious Hepatitis. TB MED 206, 3 Nov 45

IMMUNIZATION - Immunization. TB MED 114, 28 Feb 47, C-1, 26 May 49

JAPAN - Medical and Sanitary Data on Japan. TB MED 160, May 45

KOREA - Medical and Sanitary Data on Korea. TB MED 208, 6 Dec 45

LABORATORY - Function and Scope of Medical Department Laboratories. TB MED 135, Jan 45

MALARIA - Malaria Control in the Army. TB MED 164, Jun 45

PLAGUE - Plague. TB MED 124, Dec 44

POLIOMYELITIS - Poliomyelitis. TB MED 193, 31 Aug 45

RESPIRATORY INFECTIONS - Control of Disease of Respiratory System and Other Diseases Transmitted by Discharge from Respiratory Tract. TB MED 47, 28 May 44

SCHISTOSOMIASIS - Schistosomiasis Japonica. TB MED 167, Jun 45 and C-1, Jan 48. Water Treatment in Areas where Amebiasis and Schistosomiasis are Hazards. TB MED 190, Aug 45

TRENCH FOOT - Trench Foot. TB MED 81, 4 Aug 44 and C-1, 3 Oct 44

TYPHUS - Scrub Typhus Fever (Tsutsugamushi Disease). TB MED 31, 21 Jan 48
Epidemic (louse-borne) Typhus. TB MED 218, 17 Apr 46

VENEREAL DISEASE - Management of Venereal Disease. TB MED 230, 6 Jan 48

VIRUS - Neurotropic Virus Diseases. TB MED 212, 16 Jan 45. (See Poliomyelitis, Infectious Hepatitis and Japanese B Encephalitis.)

SPECIAL PROBLEMS IN ENVIRONMENTAL SANITATION IN KOREA

Lt. Colonel Stanley J. Weidenkopf, MSC, Sanitary Engineer, Medical Section, GHQ, FEC

The fundamental purpose of environmental sanitation is to prevent the spread of communicable diseases by regulating those objects or vectors which may serve as vehicles for the transmission of pathogens from a reservoir of infection to a susceptible population.

In Korea conditions are favorable for the spread of many communicable diseases. There is an ample reservoir of United States and Asiatic diseases; there are the transmitting vehicles; and there is a more or less susceptible military population. Little can be done to minimize or decrease the reservoir. It is present in the civil population, in allied troops from many parts of the world, in enemy troops, in our own soldiers, and in animal reservoir hosts.

The resistance of our troops to these diseases is less than in civil life because of greater physical strain, and frequent changes in environment,

food, and living habits. Also, the soldiers come from all sections of America and are for the first time brought into close contact with many diseases to which they have little or no resistance. The resistance of our troops to some diseases is raised as much as possible by immunizations and other measures, but a big portion of the disease control program rests on the prevention of transmission of the pathogens from the reservoir to the new host. This is the environmental sanitation program. It is not intended to improve the aesthetic conditions in Korea but is a direct attack on the transmission of pathogenic organisms. Every recommended measure has a direct bearing on the control of one or more diseases, and in many cases the environmental control is the only control or at least the most effective control measure available.

One of the criteria which has been used to measure

the amount of sickness in armies down through history has been the ratio of the number of deaths due to disease as compared with the number of deaths due to battle. In the 19th Century it was not uncommon for as many as thirteen men to die from disease for every one who succumbed to battle injury. In our United States Armies, the experience in the Civil War on the Union side was that about two-thirds of all deaths was due to disease. During the Mexican war the ratio was about seven deaths due to disease to each one due to battle. In the Spanish-American war the ratio was even worse, with thirteen dying from disease for every one in battle. During World War I there were still more deaths due to disease than battle; but during World War II the United States Army set a health record never before approached by any Army in any war, with only one death from disease for every sixteen from battle. There were several factors responsible for that favorable record. Two of them were: improved control of infections, and far fewer infected persons. The record in Korea, in one of the poorest environmental conditions our Army has ever fought in, compares favorably with that of World War II. Only constant attention to preventive medicine and sanitation has held the disease incidence to this record low figure.

Medical officers and unit commanders have a joint responsibility for sanitation. The senior medical officer or surgeon of a command is an advisor to the Commanding Officer on all matters pertaining to sanitation within the Command. This includes developing programs, supervising and inspecting sanitation, reporting and advising. The Commanding Officer is responsible for enforcing sanitary regulations within his organization and the boundaries of his unit area.

For convenience in discussing the environmental control of communicable diseases they can be placed in the following five groups:

1. Respiratory - Usually transmitted by discharges from the nose, mouth, throat or lungs. Examples - common colds, pneumonia, scarlet fever, and diphtheria.
2. Intestinal - Usually transmitted by food or water contaminated with feces or urine. Examples: Typhoid fever and dysentery.
3. Insect-borne - Transmitted by blood sucking insects. Examples: malaria and typhus fever.
4. Venereal Disease - Usually transmitted during sexual intercourse. Examples: Syphilis and Gonorrhea.
5. Miscellaneous - Those communicable diseases which do not readily fall into the above groups. Examples: tetanus, rabies, scabies and dermatophytosis.

The basic principles of the sanitation program employed in Korea are the same as in civilian life or in other military operations. The main difference is not one of principle but rather one of degree of enforcement. The conditions encountered in Korea necessitate an exceptionally high degree of sanitation. The excellent health record attained by the troops in that area attests to the efficacy of the control measures. The special environmental control measures which have been found most useful in Korea are:

1. Respiratory Diseases: The only applicable control measure for this group of diseases is to prevent overcrowding in quarters and places of assembly such as mess halls, recreation rooms, and post ex-

changes. This is not a problem in the summer but may be a very real problem in cold weather when all soldiers tend to accumulate and crowd together in the few available warm places. A determined effort will be required to keep the troops spread out to prevent the easy exchange of air borne pathogens.

2. Intestinal Diseases: Environmental sanitation has been remarkably effective in controlling this group of filth diseases. The principle diseases are common diarrhea, bacterial food poisoning, bacillary dysentery, amebic dysentery, typhoid and paratyphoid fever, helminth infections and cholera. Infectious hepatitis, as it appears in Korea, may also be an important member of the group of diseases that is transmitted by water and food.

Triple-typhoid vaccination gives considerable resistance to typhoid and paratyphoid fevers and cholera vaccination gives limited protection against that disease. However, there is no practical means of building up immunity against the other intestinal diseases or infectious hepatitis. The most effective means of controlling these diseases is to control the agencies which transmit them - human wastes, flies, food and water. Close attention must be paid to the following measures:

1. Purification and protection of water supplies.
2. Mess Sanitation, including careful selection and supervision of food handlers.
3. Fly Control
4. Waste Disposal
5. Personal cleanliness and hygiene.

The Medical Service is responsible for determining whether or not water is safe to drink and whether or not there is an adequate amount of water provided for physiological and hygienic needs. To accomplish this the Medical Service inspects water points and sources, tests water (for presence of chlorine and bacteria) and in general works closely with the Corps of Engineers to insure that water is properly treated and distributed.

There are two general water treatment methods employed in Korea. One is the engineer water point method and the other is the individual canteen method. Water points produce the major portion of the water; the canteen method is reserved for emergencies and those situations where it is not possible for water-point water to be supplied to the troops.

The treatment process employed at the water points is similar to that used by civilian water plants in the United States. The main differences are that the Army water plants are portable and the filtering media is diatomite instead of sand. The final product of these portable units should be just as good, if not better, than the water which we are used to drinking in the United States. The steps in the water treatment process are:

1. Coagulation with alum and soda ash to form a gelatinous precipitate called "floc".
2. Sedimentation. As the floc forms and then settles it entraps the suspended and particulate matter in the water and carries it to the bottom of the sedimentation tank.
3. Filtration. The clear supernatant is taken off the top of the sedimentation tank and filtered. The Army has two types of filters - sand and diatomaceous earth. The diatomaceous earth type will remove the cysts of *Endamoeba histolytica* and is therefore the approved type for use in Korea.
4. Chlorination. Water is chlorinated to kill any

organisms which may have escaped the sedimentation and filtration steps, and to remain in the water to prevent its recontamination. The required amount of chlorine in the water at the water point is 5.0 parts per million. As water is transported and handled there is a gradual loss of chlorine due to evaporation and chemical composition with elements in the water. The water should be tested from time to time to make certain that the residual never falls below 2.0 ppm which will normally prevent recontamination. If the residual falls below this minimum, more chlorine should be added.

The reasons for this high chlorine requirement are bacteriological, chemical, and safety factors. High concentrations of chlorine are required to inactivate the cysts of amebic dysentery and the virus of infectious hepatitis. Low winter-time temperatures slow down the chemical activity of chlorine. When these two factors are compounded and a factor of safety is added to provide for frequent exposure of the water to recontamination after it is treated, it adds up to the above chlorine requirements. The tastes and odors developed by this high chlorine content are detectable but not particularly objectionable. The usual water-point water as delivered to the troops in Korea contains more chlorine, fewer bacteria, and less taste and odor than the water of some of the major cities in the United States.

Water treatment within the individual canteen is accomplished by adding Halazone (Chlorine compound) or iodine tablets to the canteen of water. In general, the troops should be furnished water-point water whenever possible. The canteen method depends on the discipline of the individual soldier and a lower concentration of chlorine (or iodine) to treat unfiltered and frequently dirty water. Individual canteen treatment is an emergency method for water treatment.

New type water purification tablets are now available. They are an 8 mg Halazone tablet and an 8 mg Iodine tablet. The old tablets contained 4 mg Halazone. The iodine tablets appear to have better cysticidal properties and are therefore recommended for use in areas having a high incidence of amebic dysentery. Water is treated in canteens by adding one (1) of the new, 8 mg tablets to each canteen of water. If the water is dirty two (2) tablets are added to each canteen. The water is not to be drunk until 30 minutes after the tablet has been added. If special water supply problems are encountered, the assistance of a Sanitary Engineer should be secured. There are several in the Preventive Medicine Units and one in the Army Surgeon's Office. (From Ref 9).

Mess Sanitation: Hygiene standards in messes are maintained by constant supervision of mess sanitation and the work habits of all personnel employed in messes. The following measures should be enforced:

1. Kitchens and mess halls should be screened against insects whenever possible. DDT, 5% residual spray (QM Stock No. 51-1-305) is to be applied to the walls or tent.
2. After use, mess kits are washed thoroughly in a container filled with hot soapy water. A long handled brush is used for washing. They are rinsed by dipping several times in a second container filled with clear boiling water, and disinfected by immersing for not less than 3 seconds in a third container filled with clear boiling water.

3. When adequate amounts of hot water cannot be obtained to sterilize utensils, the following may be used: Utensils are washed in hot soapy water and then immersed for not less than three seconds in a chlorine solution containing at least one level table spoon of high test calcium hypochlorite (70% available chlorine) to each ten gallons of water. (QM Stock No. 51-C-450).

Toilet facilities and hand washing including soap and hot water should be provided conveniently for all food handlers. Personnel should be instructed to wash hands after every visit to the latrine.

A pre-employment physical examination is required for all food handlers, and the periodic or monthly physical inspection is no longer required. A daily inspection by mess sergeants or immediate supervisors of food handling activities is mandatory for the purpose of eliminating all with signs of illness, skin diseases, infected cuts or boils.

Indigenous Food and Beverages: Foods and beverages from indigenous sources are considered contaminated and should not be consumed. Under no circumstances are leafy vegetables such as cabbage and lettuce served raw. Hard skinned fruits and vegetables, after being washed free of adhering dirt, may be disinfected by immersing in water at 160°F. for 1 minute or by immersing for 30 minutes in water containing at least one level tablespoonful of high test hypochlorite (QM Stock No. 51-C-450) in 10 gallons of water.

Waste Disposal: Wastes include human wastes (feces and urine), kitchen wastes and trash. (From Ref 9).

a. In the field:

(1) Pit latrines or straddle trenches areas normally used to dispose of excreta. In certain areas where pit latrines cannot be constructed due to wet or frozen ground or surface rocks, bucket or mound latrines may be used.

(2) Latrine buckets are emptied and cleaned daily and the contents buried, incinerated or disposed of by other sanitary methods. Pit latrines are located at least 100 feet down slope from any source of water supply and 200 feet from any kitchen, dining or food storage area.

(3) Latrine boxes should be scrubbed daily and contents of the pit sprayed twice weekly with a residual DDT solution.

(4) Straddle trenches should be constructed in accordance with the instructions contained in FM 21-10.

(5) Urinals with soakage pits are provided at all deep pit latrines and at other convenient locations throughout the camp area. Urinals should not be constructed to drain into latrine pits since such a practice causes undesirable odors.

(6) Kitchen liquids, shower and bath waste: In most instances these wastes may be disposed of by using a grease trap and soil absorption system (FM 21-10).

(7) Garbage, combustible and non-combustible wastes: The most practical method of disposal of these materials in the field is by burial.

b. Fixed or semi-permanent installations:

(1) Deep pit latrines are provided for 8% of the command. They must be fly-proof and policed daily.

(2) If buildings are utilized, the doors, windows and other openings should be screened. The interior and exterior should be sprayed twice weekly with DDT. The instructions in FM 21-10 will be followed in constructing and maintaining latrines.

3. Insect Borne Diseases - In addition to the pathogens which an insect may physically carry on its body and move from one place to another, there is a group of pathogens carried by insects which gain entry to man through the bite of the insect. The insect obtains the pathogen from the reservoir of infection, transports it, and then provides a portal of entry into the new host.

The diseases of this group which may be encountered in Korea and the transmitting insects are:

<u>Disease</u>	<u>Transmitting Insect</u>
Malaria	Mosquito (Anopheles hyrcanus)
Japanese B Encephalitis	Mosquito (Culex tritaeniorhynchus)
Endemic Typhus	Fleas (Xenopsylla cheopsis)
Epidemic Typhus	Lice (Pediculus humanus)
Relapsing Fever	Lice (Pediculus humanus)
Tsutsugamushi Fever (Suspected cases not yet confirmed)	Mites (Trombicula akamushi)

The control of this group of diseases is primarily one of controlling the insect essential to the transmission of the disease. Little can be done to control the reservoir of these diseases, and not too much can be done to increase the resistance of the susceptible population. Malaria can be temporarily suppressed with chloroquin; and some resistance can be developed by giving vaccinations for epidemic typhus and Japanese B encephalitis. However, the essential element in the disease control program is the prevention of the transmission of the pathogen from the reservoir to the new host.

Control of insect vectors is based on efforts directed either toward destruction of the insects after they are grown or prevention of their breeding. The former is best exemplified by the various delousing processes used in typhus control; and the latter by mosquito control in the prevention of malaria and Japanese B encephalitis. At times it is simpler to divert attention to the animal that harbors the insect, the vector of a vector, as in the case of endemic or scrub typhus through the eradication of rats. In this case the attack on the rats brings about a simultaneous destruction of both the reservoir and the vector. (From Ref. 9)

Insect Control; The control period for warm weather insects in Korea extends from mid-April to mid-October. There is no insecticide known that will effectively control adult migratory insects unless the breeding sites are also controlled. The recommendations below are contingent upon elimination of breeding

areas for 100% effective control. The DDT insecticides issued by the Army can be safely employed, but it must not be overlooked that DDT is a toxic material. In general, inhalation of dusts, sprays, or mists containing DDT should be reduced to a minimum. Contamination of food with DDT must be prevented.

Organizations control insects by using the following measures:

1. Buildings or tents occupied by military personnel are treated before occupancy or as soon thereafter as possible with 5% DDT residual spray (QM Stock No. 51-I-305) which may be applied with 3-gallon hand pressure sprayers. Two applications should be applied seven days apart and twice monthly thereafter or as indicated. One gallon of liquid spray should be sufficient for uniform coverage of 1000 square feet of wall surface.

2. DDT powder, 10% (QM Stock No. 51-I-180) is applied to the floors of all occupied buildings in Korea. Two applications seven days apart and as often thereafter as necessary, with hand or rotary dusters in sufficient quantities that a thin film of dust over the entire floor and bedding can be observed is considered to be sufficient. This treatment is for control of human fleas commonly found in all public buildings in Korea.

3. DDT emulsion concentrate (QM Stock No. 51-I-156) in a dilution of one to four parts water is used in a three-gallon hand pressure sprayer to treat latrines twice weekly or more often as necessary to control fly breeding. Military units who do not have personnel trained in the preparation and use of this material should not requisition or attempt to use DDT emulsion concentrate. DDT 5% residual spray may be substituted for use of the above in the absence of trained personnel.

4. For quick kill of entrapped insects in mess halls, latrines and other buildings, DDT finished spray (QM Stock No. 51-I-169) is used in 2-quart hand sprayers. This material is applied in space and not to the wall surface. There is no residual effect in this material. Aerosol bombs (QM Stock No. 51-I-159) may be used as a substitute, but are not recommended except in emergencies because they are more expensive than the finished spray and hand sprayers.

5. DDT Louse Powder, 2 oz can (QM Stock No. 51-I-173) is used for individual protection against fleas and lice. For control of fleas, a liberal amount is sifted on the body next to under-clothing. For protection against and control of body lice, this material must be dusted in and around all seams of under-clothing and rubbed into the fabric by hand.

6. Insect repellent, 2-oz bottles (QM Stock No. 51-I-265) is used by personnel not protected from mosquitoes by other means. Insect repellent must be applied to all exposed parts of the body as often as necessary. Care must be exercised to prevent contact with the eyes to prevent injury.

Malaria Control - The malaria season in Korea extends from mid-April to mid-October. During this period the following measures should be employed by individual soldiers as protection against malaria:

1. Malaria discipline is strictly enforced.
2. Personnel sleep under mosquito nets.

3. Aerosol bombs are used to kill mosquitoes under mosquito bars and in enclosed buildings.
4. Insect repellent is used to supplement other protective measures.
5. Shirts are worn with sleeves rolled down from dusk to dawn.
6. Chloroquine (Item No. 1-139-290; 100's) (1-139-300, 1000's) is administered to all personnel in a dose of 0.5 grams (one tablet) once each week preferably on Sunday at the noon meal.

Typhus Control: The typhus season in Korea is considered to be from November to May. Personal cleanliness is the most effective single means of preventing typhus. Personnel are required to bathe by roster and to effect a complete change of clothing at least once every ten days. At the time of showering and clothing exchange a physical inspection should be made to determine the presence of lice. During the typhus season military personnel should dust two-thirds of a 2-oz can of Louse powder into the seams of their underwear, especially around the arm, shoulder, neck and crotch and the remainder of the can on the body, head, armpits and pubic region. This is done at least every two weeks, and whenever clean clothing is obtained. If troops are found to be infested, mass delousing by roster with Louse powder is accomplished. If special insect control problems are encountered or assistance is needed, the help of an Entomologist should be requested. There are Entomologists in the various Preventive Medicine units and in the Army Surgeon's Office.

Venereal Diseases - Venereal diseases are normally

transmitted by direct physical contact. There is no evidence that food, fomites (toilet seats or clothing), public baths, swimming pools or beaches play any part in the transmission of venereal diseases. As the environment is not an essential link in the chain of infection of these diseases there can be no environmental control of these diseases.

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3. Military Water Supply and Purification - TM 5-295
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SOME PARASITIC WORMS AND PROTOZOA OF THE FAR EAST

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There are a number of parasitic diseases caused by helminths or protozoa which are highly endemic throughout the Far East. Fortunately the UN forces and other occupation personnel are under sufficiently rigid control, from the standpoint of public health, that little danger exists of contracting most of these diseases. This assumes an intelligent awareness of the avenues of infection on the part of all concerned. However since these diseases may be relatively unfamiliar to many, their epidemiology will be considered briefly.

Malaria: There are four species of malaria generally recognized as infecting man throughout the world. These are: Plasmodium vivax or tertian; Plasmodium malariae or quartan; Plasmodium falciparum or estivo-autumnal and Plasmodium ovale.

1. In Korea - It is highly probable that one type, tertian, caused by P. vivax, will be the cause of practically all of the cases of malaria among the UN personnel. This prediction is based upon the following: (1) It was the only species encountered in the survey of parasitic diseases made in Korea in 1948; (2) Japanese scientists who have lived and worked in Korea for about twenty years report considerable P. vivax, rare P. malariae and no P. falciparum (except 18 cases, believed to have been in drug addicts¹). Plasmodium ovale is so rare it

was not even mentioned or considered by the Japanese workers; (3) P. vivax was the only species confirmed by laboratory examination of blood smears from troops in Korea.

2. In Japan - Malaria has never been considered a serious problem in Japan. In fact, it was never regarded as a reportable disease until the Occupation. Since that time there have been cases reported every year among the native Japanese but never in alarming numbers. The incidence is apparently much lower than in Korea, though comparative statistics are not available. Also, as in Korea, it is very probable that P. vivax will be the only species found to be endemic.

While it is possible that malaria may occur among troops in Japan, it has been observed entirely in personnel returning from Korea, the Philippines or Okinawa. It is believed that there has been no transmission to the UN forces stationed here. However, with the return of troops who were in Korea during the 1950 malaria season the possibility of transmission is greatly increased. Many of these men who were on suppressive chloroquine in Korea have now developed malaria or had relapses in Japan. As the mosquito vector, Anopheles hyrcanus sinensis, is widely distributed through Japan the possibility of transmission among military units stationed here must be considered. For this reason malaria disci-

pline should be strictly enforced in Japan as well as in Korea. While general chloroquine suppression in troops in Japan is not advocated, it is considered important that the malaria patient be given chloroquine weekly in order to avoid another relapse and that all troops returning from Korea be continued on suppressive therapy for a period of at least 4 weeks after their return to Japan.

Filariasis: This disease is caused by either one of two closely related parasites, Wuchereria bancrofti or W. malayi, when in the lymphatics or connective tissue of man. The offspring of the adults, known as microfilariae, are characteristically present in the circulating blood. Both species occur in man in the Far East, from Japan and Korea down along the coastal regions south to Malaya, the Netherlands East Indies, northern Australia and the islands of the South Pacific.

1. In Japan - No cases of filariasis have been found among the UN troops in Japan. However, both species may be found among the Japanese in limited areas³.

2. In Korea - Although filariasis exists in South Korea and in persons living on some of the islands off the coast, such as Cheju-do, it is not expected that the disease will become a problem among the UN forces in Korea^{1,2}. The only possible exception would be in the vicinity of the PW camps if adequate control measures against mosquitoes were not practiced.

Schistosomiasis japonica⁴: Schistosomiasis japonica, or Oriental blood fluke disease, caused by the parasite Schistosoma japonicum, is known to be endemic in the Far East. It was originally described from Japan and its continued existence there was recognized by both Japanese and American workers. The disease is caused by a minute (about 0.26 mm.), skin-penetrating, larval parasite, called a cercaria, that emerges from a small fresh-water snail. Thus the infection is limited only to those areas in which these snails thrive, where it is acquired as people swim, work, wade, wash clothes and/or vehicles, or possibly drink the infested water. The endemic areas of schistosomiasis japonica in the Far East will be summarized briefly:

1. In Japan - Only a single species of snail, Oncomelania nosophora, is known to transmit the disease in Japan. Because questions are raised each year concerning areas to be put "Off Limits" for recreational purposes on account of this disease, it seems appropriate to outline the five known regions in which the disease occurs. It is hoped that this information will be useful to persons in command of troops as well as those in charge of isolated, or smaller units, or those associated with the recreational program of Japan. These areas are delineated below:

a. The Tone Valley - The snail host occurs in the marshy areas between the levees and the channel of the Tone River, involving Ibaraki Prefecture on the north and Chiba to the south. Most of the distance between Sakai to the west and Sawara, fifty miles down river, is involved. The disease may extend below Sawara. Additional foci include Sakura in Chiba Prefecture and the vicinity of Towa and Hikonari villages immediately north of Tokyo and just west of the Edo River in Saitama Prefecture.

b. The Kofu Valley - This valley lies in

Yamanashi Prefecture nearly 100 miles west of Tokyo. It has an area of approximately 90 square miles and is probably the largest and most densely populated endemic region in Japan. The incidence of the disease is very high in many parts of this valley. The snails are limited to the irrigation ditches and the paddies in such vicinities. No snails have even been found around the five lakes at the base of Mt. Fuji so these waters may be regarded as being safe for recreational purposes as far as schistosomiasis is concerned.

c. The Numazu Area - This region lies in Shizuoka Prefecture and begins at the western edge of the city of Numazu and formerly extended for 10 miles west along the mile wide coastal plain through Sudo village. Actually today only two foci still exist; one at the northwest edge of Numazu and the other in the marshes around Sudo village, the intervening areas apparently being devoid of snails.

d. The Katayama Area - This endemic center situated in Hiroshima Prefecture is where the disease was first found and is located immediately to the north of Fukuyama City. It is a relatively small area along the Takaya and Ashida rivers; snails are largely limited to the irrigation ditches.

e. The Tosu-Kurume Area - This region in Fukuoka and Saga Prefectures is one of the largest endemic areas of Japan and covers about 90 square miles between Tosu on the north and Kurume on the south, in contiguous Saga and Fukuoka Prefectures. There is a dense snail population in the vicinity of Kurume and along the Chikugo River as well as in the irrigation ditches throughout the region.

2. In Korea - The TB MED 2085 on Korea suggests the presence of S. japonicum in Korea. However, no evidence of the disease was found in a survey made in South Korea in 1948, no snail hosts were encountered, no record of autochthonous infections and no information on the presence of cases from Japanese parasitologists who lives in Korea for many years. Two cases of schistosomiasis, found at autopsy, were reported in the literature in 1926, but subsequent evidence points to a probable error in the identification of the eggs. Thus it must be concluded that schistosomiasis is not present in Korea.

3. In Formosa - Schistosomiasis japonica is known to be established among the mammals in Formosa. One area in Taichung Prefecture, in the central part, was found to be endemic for man. Recently a second area was discovered in Kaoshiung Prefecture, at the southern end⁶. The snail intermediate host, Oncomelania formosana, is widely distributed along the west coast and several other regions are suspected of harboring human cases. Consequently, it is well to regard the entire western half of the island with suspicion, as infected snails may be present, due to the wide distribution of the snail and various mammalian hosts.

4. In China - This disease is widespread throughout many areas of China. In general the chief endemic areas embrace the Yangtze Valley, especially the tributaries and neighboring lakes. It also occurs down the coast from the mouth of the Yangtze to Hongking, and in certain centers in Kwantung, Kwangsi and Yunnan provinces. Any region in this general location should be regarded as a potential schistosomiasis area and treated as such. Several species of the snail belonging to the genus Oncomelania serve as the intermediate host.

5. The Philippines - Five of the main islands possess endemic areas of schistosomiasis japonica. These are: the southern tip of Luzon, the northeastern coast of Mindoro, several isolated areas on Samar and Mindanao and the eastern coastal plain of Leyte. In these areas the snail host is Oncomelania quadrasi.

6. The Celebes - Recently schistosomiasis japonica was discovered to be endemic near Lindöe Lake in the Palöe district. Here, 50% of the inhabitants of three villages, as well as dogs and native deer, are infected.

Taking all of the endemic areas for schistosomiasis japonica in the Far East into consideration it has been calculated that at least 46 million persons are infected. From this figure it will be realized that schistosomiasis constitutes one of the more important diseases of the Orient.

Paragonimiasis: This is a disease of man caused by the Oriental lung fluke, Paragonimus westermani, usually encapsulated in the parenchyma of the lung. Although reported from South America, Africa and India, the chief endemic centers lie in the Far East where 3.2 millions are believed to be infected⁷, especially in certain regions of the Philippines, Central China, Formosa, Japan and Korea.

The disease is acquired by ingesting the resting or metacercarial stage of the worm, encysted in certain species of crayfish, fresh-water and/or marine crabs. The latter migrate up tidal rivers during the early summer, returning to the sea in the late fall. These crustaceans are often included in the diet of the indigenous population and eaten when improperly cooked or raw. Infection is not usually caused by drinking or swimming in infested water, as was implied in the recent article in TIME magazine.

Because of the method by which the infection is acquired, paragonimiasis should not become a problem among most of the UN forces, but may be expected among North and South Koreans, Chinese and Japanese. Some of the more important endemic centers of Japan and Korea are outlined below:

1. In Japan - Parts of five prefectures are generally recognized as constituting the principal areas. On Honshu the disease occurs in Shizuoka, Osaka and Gifu Prefectures, while on the island of Shikoku it occurs at the western end, in Ehime Prefecture, where in one community 6.8% of the people were infected and 30% of a suspected group of 83 were positive. On Kyushu there is an endemic center along the western coast in Kumamoto Prefecture.

2. In Korea - In general it may be said that paragonimiasis is prevalent wherever there are slow flowing coastal waters. The endemic centers lie in the following areas:

- a. West of Taejon, in the Kum River Valley.
- b. Near Seoul, along the tributaries of the Han and Imjin Rivers.
- c. From Sariwon to Pyongyang, along the Chaeryong and Taedong Rivers.
- d. Along the streams of the coastal plain between Wonson and Hungnam.
- e. We suspect the streams in the area of

Sinanju but do not at present have any data.

In closing it should be stressed again that few if any cases of paragonimiasis may be expected in the UN forces.

Clonorchiasis: This disease is caused by the presence of the Oriental liver fluke, Clonorchis sinensis, in the biliary passages where it may be associated with proliferation of the biliary epithelium, connective tissue hyperplasia and more rarely fatty degeneration and cirrhosis of the liver. This parasite not only occurs in man in the Far East but also is quite common in other fish-eating mammals.

The principal endemic centers of human infections are China, French Indochina, Formosa, Japan and Korea. It is acquired by ingesting the encysted and metacercarial stage which is found on the scales or in the tissues of 40 or more species of fresh-water fish.

Actually, the eggs of Clonorchis sinensis will be found in random samples in 5 to 10% of the indigenous population of Japan and Korea. In certain limited areas where the incidence of infected fish is high and where these fish are eaten raw or improperly cooked, definite endemic centers occur. It has been estimated by Stoll⁷ that there is a world incidence of some 19 million with this parasite. The more important areas in Japan and Korea are:

1. In Japan - Probably the best known and heaviest endemic center occurs in the vicinity of Kojo in Okayama Prefecture on Honshu. Here over 40% are infected and clinical cases have been observed. Other areas are located in the vicinity of the Tone River Valley near Tokyo in Saitama, Chiba and Ibaraki Prefectures; in Niigata Prefecture; in Shiga Prefecture (the Lake Biwa area); and in Ishikawa Prefecture near Nanao.

2. In Korea - In 1948 the incidence of Clonorchis infections in South Korea ranged from 0 to 41% by community. The greatest numbers of infected persons were encountered near Taejon and Pusan. No recent data are available on area north of the 38th parallel, but like Japan there is no reason to believe that more than 10% of the entire population harbor this parasite. It should be stressed that clonorchiasis need not be expected in any great numbers among our present UN forces.

Intestinal Helminths: Several species of intestinal worms are commonly found in the indigenous population of the Far East. Among the most commonly encountered are the large round worm - Ascaris lumbricoides, the whipworm; Trichuris trichura, hookworms - Ancylostoma duodenale and Necator americanus, the Oriental trichostrongyle - Trichostrongylus orientalis, and the pinworm - Enterobius vermicularis. Although these parasites have a high incidence in the indigenous populations, Americans and other UN troops will be little affected by living among them. Occupation forces in Japan showed only about a 5% increase of worms and protozoa when compared with those who were here less than three months. A similar comparison of American personnel in Korea in 1948 suggested about an 8% increase, while on Okinawa in 1949 it was approximately 12%. The recent conflict has increased exposures in Korea but in the limited series available for study there was a negligible increase ever among combat units.

Considerable concern is often expressed by the medi-

cal officer over the utilization of indigenous personnel in mess halls as waiters, etc. It should be pointed out here that with only a limited number of parasites need the acquisition of helminths by troops be feared. For example, the eggs of both Ascaris and Trichuris require between 10 and 21 days or more before they become embryonated and are infective for man. The possibility of such eggs remaining under proper environmental conditions of moisture, temperature and humidity in mess halls or kitchens should be extremely unlikely. It seems improbable that conditions would become satisfactory for the development of infective hookworm larvae, even though the time required is considerably less. The only parasite of concern among those mentioned above is pinworm, E. vermicularis, whose eggs are infective a few hours after deposition. Others which should be considered dangerous in food handlers are: the dwarf tapeworm, Hymenolepis nana, and the pork tapeworm, Taenia solium. The latter is also important because of the possibility of autoinfection. However, to date these parasites have been infrequently encountered and so are not believed to constitute a preventive medicine problem.

Intestinal Protozoa: A number of species of intestinal protozoa are found in man in all parts of the world. Those commonly encountered and reported include Endamoeba histolytica, E. coli and Endolimax nana, while Giardia lamblia, Chilomastix mesnili, Iodamoeba bütschlii and several other species are found more rarely. Of these, only two, the ameba - E. histolytica and the flagellate - Giardia lamblia, need be of concern to the medical officer. Endamoeba histolytica is regarded as a pathogen which causes amebiasis, an infection of the colon, which is characterized by acute or chronic phases, or both, as well as by a variable clinical picture. There is considerable controversy concerning the pathogenicity of Giardia lamblia; however, since it is a moot question, it is felt that such infections should be regarded with suspicion as the parasite has been found both in the duodenum and gall bladder.

It is interesting and important from the epidemiologic viewpoint that the protozoa are spread largely by dissemination of encysted, or resting stages, through contaminated food or water, by flies and through direct contact with fomites. Except in cases of definite outbreaks, or epidemics, it is significant that the incidence of amebiasis, in Japan for example, falls within that found in such countries as the United States where hygienic standards are supposed to be high. It may be well to consider briefly the common methods of contamination. Since these routes of contamination in both Japan and Korea are probably the same, they will be outlined and discussed briefly below:

1. By Polluted Water - This may well be the most important avenue of infection. In the Orient fecal contamination of water sources, such as streams, irrigation canals, unprotected wells and springs, is increased through the collection, transportation and application of night soil. Not uncommonly, honey buckets are washed in streams; runoff water from dooryards, gardens and fields may also introduce viable cysts into water supplies. In turn such water may serve as a source for drinking, for washing dishes or foods, or it may be used to freshen leafy vegetables for market.

Another matter of considerable concern arises when

troops are housed in buildings which are supplied with running water. Although the water may be made safe at its source by filtration and chemical treatment, there remains the possibility of contamination before it reaches the faucet. Breaks in water mains between the source and the building may be a hazard and within the billet cross-connection between water and sewage lines are unbelievably common.

2. By Flies, etc. - Flies and cockroaches have been shown to be capable of mechanically transmitting protozoan cysts. This suggests that these animals may play an important role in transmission. Their breeding habits and association with filth are too well known to need further elaboration here.

3. By Food Handlers - The infected individual who passes large numbers of cysts of E. histolytica or G. lamblia in his stool is an important potential source of infection. This is especially true if he is engaged in any way as a food handler. Consequently, all mess-hall personnel should be examined regularly, if possible, and promptly removed from their positions until the infection has been eliminated. Above all, personal hygiene should be enforced.

4. By Human Excreta - In such countries as Japan, Korea, Okinawa, China and Formosa, human excreta, or night soil, is widely used as the chief fertilizer of the dry fields and sometimes paddies. Elsewhere, sludge from sewage disposal plants is similarly utilized. Any of these practices will probably result in the heavy contamination of the root and leafy vegetables which are usually eaten raw, especially as these are typically grown in dooryard gardens which are frequently fertilized with fresh night soil.

In conclusion it should be stressed that eternal vigilance should be the watchword of those entrusted with the health of troops in the Far East. Uncooked vegetables and untreated water should never be consumed.

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LABORATORY SERVICE IN THE FAR EAST COMMAND

Lt Col Robt. L. Hullinghorst, Commanding Officer, 406th Med Gen Lab, APO 500

The basic laboratory facilities of both field and fixed type medical installations are designed primarily for diagnostic support of clinicians in the care of the sick. The larger hospitals also assume some area responsibility such as bacteriologic examination of water, and on occasion engage in limited epidemiologic investigations. The field installations in Korea are directly supported by the 8217th Mobile Medical Laboratory, a small provisional unit organized along the lines of an Army field laboratory. The 406th Medical General Laboratory in Tokyo provides third echelon laboratory support to the medical service of the theater. This laboratory has four principal missions, as follows:

1. Diagnostic support of other laboratories.
2. Public Health activities and epidemiologic investigation.
3. Blood depot service to Japan and Korea.
4. Medical research and development.

Laboratory facilities available in specific medical units depend on authorized and available equipment, supplies and facilities, the technical ability of assigned personnel, and policies prescribed by the various echelons of technical supervision.

A brief presentation of procedures available in the theater laboratory is as follows:

Pathology Department: Performance of autopsies in the Tokyo-Yokohama area; review of autopsies completed at other installations having histologic facilities; histologic examination and completion of autopsies initially performed at all other medical units; similar examination and review of surgically removed tissues; screening of specimens and forwarding of material to the Armed Forces Institute of Pathology; distribution of material for Clinico-Pathological conferences and histological study sets upon request.

Chemistry Department: Routine clinical biochemistry including investigation and evaluation of newly reported procedures; water and food analysis; complete toxicologic examinations; miscellaneous identification and analysis; analysis and assay of locally produced pharmaceutical products or those suspected of deterioration.

Serology Department: Standard tests for syphilis and other serologic procedures other than bacteriologic agglutinations and serologic tests for viral and rickettsial diseases.

Blood Bank: Supply of whole blood of Group "O" to Korea and group and Rh specific blood to hospitals in Japan.

Medical Zoology: Diagnosis and investigation of para-

sitic infections of the gastro-intestinal tract and of the blood; identification of miscellaneous types of animal life including reptiles, fish, crustaceans, etc.

Epidemiologic Investigations: The command laboratory works in close conjunction with Preventive Medicine officers of the various major commands. At the request of such officers special field teams are provided by the General Laboratory for epidemiologic investigations.

Laboratory Supplies: Those supplies listed in the Army-Navy Catalogue of Medical Materiel listed for procurement from the Army Medical Service Graduate School are stocked by the command laboratory and obtainable by direct requisition from the Medical Supply Officer, 406th Medical General Laboratory, APO 500.

Bacteriology Department: General diagnostic bacteriology; culture of *M. tuberculosis*; animal inoculation for determination of toxicity or virulence; specific identification of enteric pathogens, anaerobes, and other organisms requiring special techniques; antibiotic assay and sensitivity; supply of diagnostic bacteriologic products.

Viral and Rickettsial Department: Isolation and identification of viral and rickettsial agents causing rabies, encephalitis, smallpox, influenza, and typhus fever; serologic tests to determine antibody rises in viral and rickettsial diseases.

Entomology Department: Identification of insects of medical importance and special investigation of diseases related thereto.

Submission of Specimens: Medical installations in Japan submit material and requests direct to the 406th Medical General Laboratory through their respective hospital laboratories. Units in Korea submit materials and requests through the 8217th Mobile Medical Laboratory to afford an opportunity for expeditious examination and report by that unit when possible. It should be borne in mind that laboratory examination of submitted specimens is best accomplished when the specimens are completely identified by the submitting agency. Where a general request for examination is submitted, sufficient information concerning the clinical picture or circumstances pertaining to the specimen must be included in order to allow intelligent selection of those examinations most likely to produce an answer of value. Specific data concerning method of submission of specimens is contained in GHQ Circular No. 5, dated 11 February 1950.

Direct correspondence on technical subjects concerning specimens and involving procedures is authorized between the Commanding Officer of the 406th Laboratory and other medical service units.

IMMUNIZATION REQUIREMENTS FOR THE FAR EAST COMMAND
Consultants Division, Medical Section, GHQ, FEC

References:

(1) Section III, Army Regulations 40-210.

(2) Army Regulations 40-215.

(3) Army Regulations 42-40, Navy Department General Order No. 20, Air Force Regulations No. 160-26.

- (4) GHQ, FEC Circular No. 9, 27 February 1950
 (5) TB MED 114, War Department
 (6) CINCFE Msg ZX 34930, 22 January 1951

- (7) CINCFE Msg ZX 40004, 20 February 1951
 (8) A Guide to Worldwide Immunization Requirements, issued by The Air Surgeon, Military Air Transport Service, 15 January 1951

<u>J A P A N</u>			<u>R Y C O M</u>		
	<u>Departure For</u>	<u>Duty In</u>		<u>Departure For</u>	<u>Duty In</u>
SMALLPOX	Within 6 mos	Annually	SMALLPOX	Within 1 yr	Every 3 yrs
TYPHOID-PARATYPHOID	Basic series or stimulating dose within 6 mos.	Stimulating dose annually	TYPHOID-PARATYPHOID	Within 1 yr	Stimulating dose annually
TETANUS	Basic series within 1 yr or stimulating dose within 4 yrs	Stimulating dose within 1 yr after basic series; every 4 yrs after last stimulating dose and upon occurrence of wounds or burns	TETANUS	Same as JAPAN	Same as JAPAN
CHOLERA	Basic series or stimulating dose within 6 mos.	Not required	CHOLERA	Basic series or stimulating dose within 1 yr	Not required
TYPHUS	Basic series or stimulating dose within 6 mos	Stimulating dose annually	TYPHUS	Not required	Not required
<u>K O R E A*</u>			<u>M A R B O</u>		
SMALLPOX	Within 6 mos	Every 6 mos.*	SMALLPOX	Within 1 yr	Every 3 yrs
TYPHOID-PARATYPHOID	Basic series or stimulating dose within 6 mos	Stimulating dose annually	TYPHOID-PARATYPHOID	Within 1 yr	Stimulating dose annually
TETANUS	Same as JAPAN	Same as JAPAN	TETANUS	Same as JAPAN	Same as JAPAN
CHOLERA	Basic series or stimulating dose within 6 mos.	Stimulating dose as directed by CG, EUSAK	CHOLERA	Not required	Not required
TYPHUS	Basic series or stimulating dose within 6 mos.	Stimulating dose as directed by CG, EUSAK	TYPHUS	Not required	Not required
			<u>P H I L C O M (A F)</u>		
SMALLPOX	Within 1 yr	Every 3 yrs	SMALLPOX	Within 1 yr	Every 3 yrs
TYPHOID-PARATYPHOID	Basic series or stimulating dose within 1 yr	Stimulating dose annually	TYPHOID-PARATYPHOID	Basic series or stimulating dose within 1 yr	Stimulating dose annually
TETANUS	Same as JAPAN	Same as JAPAN	TETANUS	Same as JAPAN	Same as JAPAN
CHOLERA	Basic series or stimulating dose within 1 yr	Not required	CHOLERA	Basic series or stimulating dose within 1 yr	Not required
TYPHUS	Not required	Not required	TYPHUS	Not required	Not required

*Korea is an epidemic smallpox area, hence personnel departing from Korea, regardless of destination, must have been successfully vaccinated against smallpox not less than two (2) weeks prior to departure and within the previous six (6) months' period. An exception to this rule may be made for emergency medical evacuees.

NOTES:

1. Compliance with the requirements for duty in Korea fulfills the requirements for travel to Japan from Korea except with respect to smallpox vaccination as indicated above.

2. Diphtheria: Diphtheria immunization or a Schick negative status is required for all dependents in the FEC between the ages of six (6) months and fifteen (15) years. Stimulating doses of diphtheria toxoid should be given two (2) and five (5) years

after initial series. (When given in combination with pertussis vaccine, diphtheria toxoid may be administered to infants three (3) months of age.)

3. Japanese B Encephalitis and Influenza: Japanese B encephalitis and influenza vaccinations are special procedures applied as directed by the C-in-C, FEC, and their accomplishment is not a requirement for travel. For the 1951 season, Japanese B encephalitis vaccination is required in Japan, Korea and Okinawa.

4. Travel to the United States, Hawaii and Alaska: Compliance with requirements for duty in the area being departed fulfills the requirement for return to the United States, Hawaii and Alaska except with respect to smallpox vaccination for those departing from Korea, as indicated above.

5. Requirements for Other Travel: Requirements for travel to areas outside the FEC and other than di-

rectly to the United States, Hawaii and Alaska vary considerably and depend in large part on the requirements of the countries of transit and destination. For these requirements, reference should be made to TB MED 114 (for strictly military requirements) and

to MATS "Guide to Worldwide Immunization Requirements" dated 15 January 1951, for overall and local requirements. For information concerning special cases and situations, queries should be made to the major command surgeon or to the Medical Section, GHQ, FEC.

SMALLPOX VACCINATION

Colonel Arthur P. Long, MC, Preventive Medicine Consultant, GHQ, FEC

A highly virulent form of smallpox has been endemic and, at times, epidemic, in Japan and Korea for many years. Since the early days of the occupation however, this disease has been well controlled in Japan where only occasional cases are now reported. The experience has been otherwise in Korea. There smallpox has continued to be a serious problem for the native population. From this reservoir there has occurred about 40 cases of smallpox among United Nations personnel during the past year of military action in Korea. These cases, without a doubt, were the result of unsuccessful vaccinations. In almost every instance evidence of previous successful vaccinations were lacking.

The procedure of smallpox vaccination is not to be undertaken lightly nor with the idea that it requires neither skill nor attention. The contrary is true. Only successfully performed vaccinations protect against smallpox. A poorly performed procedure, not correctly interpreted, is worse than useless in that it gives rise to a false sense of security.

Prior to the application of the vaccine, the arm should be prepared by washing with soap and water and thoroughly dried. Ether or acetone may be applied to the area but it must be allowed to dry completely before the vaccine is deposited on the skin. It is extremely important to emphasize that alcohol or other skin antiseptics should never be used in the preparation of the vaccination site. Such antiseptics tend to inactivate the virus and hence reduce the probability of a successful vaccination. For accomplishment of the vaccination procedure, the multiple pressure method should be used. In applying this method, it is to be clearly understood that the needle is to be held essentially parallel to the skin and the side of the needle point pressed through the drop of the vaccine and into the skin about 30 times. A little resistance should be felt as the needle point is raised and no blood should be drawn. A common error in this procedure is made when the needle is held perpendicular to the skin rather than horizontal and the point then applied directly, thus making multiple "punctures" rather than multiple pressures. It is the MULTIPLE PRESSURE and NOT the multiple puncture method which is now accepted as being the most satisfactory procedure for the application of smallpox vaccine. Excessive trauma interferes with the proper interpretation of the vaccination reaction.

The area of the vaccination should be kept small. There is no proven relationship between the size of the reaction produced and the degree of immunity resulting. An area approximately 1/8th of an inch in diameter is considered satisfactory.

No dressing should be applied following vaccination. Complications to vaccinations, rare as they are, occur much more frequently in the presence of a dressing than when none is used.

It should be continually emphasized that smallpox vaccination properly performed and interpreted will prevent smallpox but that to accomplish this purpose the procedure must not be routinized to the extent that meticulous care in its accomplishment is sacrificed. It should also be emphasized that if there is known or even suspected exposure of an individual or group to smallpox, revaccination should be accomplished at once without reference to previous vaccination history. The procedure requires little time and negligible disability results. It should be clearly understood that while the occurrence of an immune reaction signifies a certain state of immunity in the individual concerned the production of this reaction will, in itself, stimulate the immunity already present and thus build it to a higher level.

Proper interpretation of the reaction produced following smallpox vaccination is perhaps the single most important feature of the entire procedure. Failures of vaccination should not result if potent vaccine is used and the method of its application is correct. However, on occasion, factors beyond the control of the vaccinator may cause a failure. When this occurs, revaccination is to be accomplished as many times as necessary until a satisfactory result is obtained. If the failure is not noted, however, and the necessary revaccination is not accomplished, the individual concerned may well be completely unprotected. In such an instance, the medical officer responsible for the conduct of the vaccination is entirely responsible and can be judged only as failing to perform his professional duty. An occasional failure to obtain a satisfactory reaction after vaccination may be justified. That such failure be unrecognized cannot be justified.

Great emphasis should be given to the fact that a definite reaction must occur and must be observed before the vaccination can be considered as satisfactory. The absence of a reaction must, in all instances, be interpreted as a failure of vaccination. In no instance should the word of the vaccinated individual be taken as to the presence or absence of a reaction. The interpretation must be made by a medical officer himself or an individual in whom he has complete confidence and whose word he is completely willing to accept. The responsibility, however, lies directly and entirely with the medical officer concerned. It is apparent from the occurrence of smallpox during World War II and again during the conflict in Korea, that failures on the part of medical officers to

interpret smallpox vaccinations accurately and to revaccinate when indicated have resulted in numerous cases and deaths from this disease.

The reactions which follow a successful vaccination are vaccinia or primary reaction, vaccinoid or accelerated reaction, or immune or immediate reaction. These are adequately described in TB MED 114, November 1944. They are also well described and illustrated in the text "Military Preventive Medicine" by Dunham, published by the Military Service Publishing Company. Every medical officer should be completely familiar with these various reactions and have a full knowledge as to their significance. Most important of all, every medical officer should be completely aware of the fact that a successful vaccination is always followed by one or the other of these reactions. No reaction at all means that the vaccine was impotent or that the procedure was performed in an unsatisfactory manner.

No vaccination should be considered to have been completed until interpreted and the type of reaction recorded on the individual's immunization register. In general, vaccinations should not be performed unless it is known that the individual to be vaccinated will be available for a period of at least one week during which time the necessary observations may be made. If, at any time, it is impossible to comply with this general rule, it is incumbent upon the officer responsible for the performance of the vaccination to arrange for satisfactory interpretation and recording by a competent and reliable individual. The medical

officer's initials following a smallpox vaccination entry on the immunization register indicates not only that the vaccination was performed but also that a satisfactory result was obtained.

It must also be borne in mind that individuals vaccinated after exposure to smallpox, must not be considered to be protected unless a definite immune type reaction occurs. Such individuals responding to a vaccination with a primary or vaccinia reaction may well develop smallpox as well. This has been demonstrated many times and most recently in Korea. Known exposees to smallpox who exhibit a primary vaccinia type reaction to vaccination must be segregated and observed for at least 16 days following the vaccination in order to rule out the possibility of the presence of smallpox which may be incubating simultaneously with the vaccinia type reaction.

Key points of importance in the conduct of successful vaccinations may be summarized as follows:

1. Use of potent vaccine shipped and stored under proper conditions (at freezing temperatures or directly on ice).
2. Use of vaccine within its expiration date.
3. Proper preparation of the vaccination area.
4. The multiple pressure method of vaccination correctly executed.
5. Proper interpretation of the vaccination result.
6. Recording and certification of the vaccination reaction.
7. Repetition of all unsuccessful vaccinations.

HEMORRHAGIC FEVER

Colonel Arthur P. Long, Preventive Medicine Consultant, GHQ, FSC

During the early summer of 1951 United Nations Forces in Korea have experienced a number of cases of an acute febrile hemorrhagic disease. The clinical syndrome observed has been one suggestive of an acute infectious process coupled with a hemorrhagic diathesis. The majority of cases have been characterized by sudden onsets with chills, fever, headache, myalgia and vomiting. Skin petechiae and mucous membrane hemorrhages have been observed in some instances. Scleral subconjunctival hemorrhages are common, particularly in the more severe cases. Other indications of hemorrhage have included hemoptysis and hematuria. Edema of the extremities and face, particularly in the region of the eyes, has been noted in some cases.

Clinical and laboratory studies have revealed albuminuria as a constant finding and frequently microscopic or gross blood in the urine. While there may be a leukopenia in the very early stages, the blood leukocyte count increases sharply within the first few days of illness reaching levels ranging between 12,000 and 78,000 with a marked shift to the left. This leukemoid reaction has appeared as a rather constant finding. Depression of the platelet count has been observed in a few instances. Bleeding and coagulation times are thought not to be prolonged.

The acute manifestations of the illness last as a rule from three to five days with the temperature falling by lysis. In the milder cases the recovery appears to have been rapid and complete after this period. In the more severe cases the hemorrhagic

phenomena become more pronounced after the fall in temperature. Frequently Oliguria may develop at this stage and in some of the fatal cases anuria has preceded death by 12 to 36 hours. In severely ill and fatal cases, signs of pulmonary involvement become manifest, frequently associated with the expectoration of pink, frothy sputum. Among the cases observed at the time of this writing there has been a case of mortality rate of approximately 15%. The duration of illness at the time of death has been most commonly six to seven days. Antimicrobial therapy has apparently been of little value. Post mortem examinations have revealed gross hemorrhage into the kidneys, lungs, eyes and pituitary glands. A constant, and perhaps the most striking feature has been the distribution of the hemorrhage in the kidneys which occurs at the corticomedullary junction and extends into the medulla. The cortex is pale and sharply demarcated from the markedly hemorrhagic medulla.

Up to this time the specific diagnosis has not been determined. The differential diagnoses considered have included Leptospirosis, Acute Leukemia, Relapsing Fever and Acute Glomerulonephritis. Also being considered is a syndrome described by the Japanese and called Epidemic Hemorrhagic Fever. Thus far the epidemiological investigations have yielded little positive information. These investigations plus clinical and laboratory studies are being conducted in an effort to define the etiology and mode of transmission of the illness, and to provide information upon which to base therapeutic and control measures.

The following chapters cover, more or less in outline form, the diseases more frequently seen in the Far East. While many topics peculiar to this geographic area are discussed, the more common diseases seen in medicine are also included, in order to provide a handy reference in symposium form. It was not the intention to make this an "all inclusive" reference text - merely to provide the medical officers in the Far East with a brief discussion of the more common disease entities. Each chapter is written by an internist who has had particular experience in his respective field.

All internists are adequately acquainted with disease etiology, symptomatology and diagnosis, hence discussion of these phases has not been included except for brief reference to diagnosis in certain instances. However, the situation, as it exists today in the Far East with the many nationalities participating in the Korean war, provides the unique opportunity for the internist to practice global medicine.

FRANCIS W. PRUITT
Colonel MC
Consultant, Internal Medicine

DIABETIC COMA, HYPOGLYCEMIC COMA, INFECTIOUS HEPATITIS, MALARIA AND ERYTHEMA MULTIFORME
Colonel Francis W. Pruitt, MC, Medical Consultant, GHQ, FEC

MANAGEMENT OF DIABETIC COMA

Diabetic coma is a medical emergency of the first magnitude which should be recognized promptly and appropriate therapy instituted without delay. The simplicity of the tests for plasma acetone* as well as acetonuria provides an immediate bedside means for confirming the diagnosis and enables the physician to institute therapy immediately.

According to Duncan, a diabetic patient having 4-plus reactions for glycosuria, acetonuria, and a 4-plus reaction for plasma acetone fulfills the chemical criteria necessary to make a diagnosis. Immediate therapy should be instituted and the following plan is recommended:

A. On Admission:

1. Regular insulin, 40 units intravenously, 60 unit subcutaneously.

2. Venepuncture for plasma acetone, sugar, CO₂ combining power, NPN, and specific gravity (whole blood).

3. With needle still in vein, fluids and chlorides, 2000 cc of normal saline rapidly (15 to 20 cc per minute).

4. Supportive measures:

a. Whole blood, if necessary, as this will aid in combatting shock and restoring base.

b. Gastric lavage if vomiting or abdominal distension; 8 ounces of warm saline may be left in stomach.

c. Enema is usually indicated but may be given as time permits.

d. Alkali. In the seriously ill patient with the CO₂ combining power around 15 volumes/per

*Rothera-Wishart Test for Acetone in the Plasma: Two drops of plasma, or serum, are placed in a Wassermann tube and supersaturated with ammonium sulfate crystals and shaken. Two drops of approximately 5% sodium nitroprusside solution are added and shaken. Two drops of ammonia water are added and shaken. Allow to stand for three minutes. Interpretation:

Permanganate color.....trace of plasma acetone
Light blue.....moderate
Deep blue or almost black...heavy reaction for plasma acetone

cent or with air hunger, 1/6 racemic molar lactate should be given in quantity necessary to raise the CO₂ to 30 volumes/per cent and NO MORE. Usually 500 cc is adequate. Remember 10 cc of 1/6 molar lactate per kilogram will raise the CO₂ one millimole or 2.2 volumes/per cent.

5. Empty bladder for complete urinalysis and leave indwelling catheter.

B. Every 30 minutes (as soon as CO₂ and blood sugar values are received):

50 units of regular insulin subcutaneously until an appreciable reduction of the plasma acetone or increase in CO₂ combining power is noted. If no improvement in six hours, increase insulin dosage to 75 units.

C. Every two hours:

1. Secure urine for sugar and acetone determination until ketosis is corrected (about 12 hours).

2. Further saline if the blood specific gravity remains above 1.055 or hematocrit remains above 50%.

D. Every four hours:

1. Blood chemistry for plasma acetone, CO₂, sugar and specific gravity until patient is conscious and retains nourishment by mouth.

2. Start glucose (1 liter of 5% in saline) by vein four hours after first dose of insulin.

3. Secure electrocardiogram and repeat at four hour intervals for 24 hours. More frequently if hypopotassemia evident.

4. If blood pressure remains below 100 systolic, give 500 cc whole blood.

E. Every six hours:

1. Repeat intravenous glucose if patient is not retaining nourishment by mouth.

2. Reduce insulin when acetone urea has cleared CO₂ combining power approaching normal and a marked reduction in plasma acetone. At this point, the physician should be careful to avoid over-administration of insulin. The interval of insulin administration may be increased to one or two hours with bladder urine used as guide according to the following:

4 plus glycosuria	- give 30 units of insulin
3 plus glycosuria	- give 20 units of insulin
2 plus glycosuria	- give 10 units of insulin
1 plus glycosuria	- omit dose
0 glycosuria	- omit dose of insulin and give 20 gm carbohydrate

F. At eight hours:

Give potassium chloride 1 gram every four hours for five doses if urine is excreted freely.

G. Diet:

When clinical improvement is apparent and it is felt the patient may safely take nourishment by mouth it is recommended that a liquid diet be given in six

equal feedings during the first 24 hours. Thereafter, the patient may be placed on a weighed diet with appropriate insulin.

HYPOGLYCEMIC COMA

This state of affairs demands prompt action on the part of the physician or a severe case may terminate fatally.

A. Diagnosis:

Usually this shock state occurs in individuals who are known diabetics and is precipitated by too much insulin or inadequate caloric intake. Skin is moist and patient generally perspiring. The hydration is good and eyeball tension is normal. Urine and blood sugar will confirm the diagnosis. If there is not a history of diabetes, the physician should expect other causes of organic hypoglycemia, although coma is rare in the latter conditions.

B. Treatment:

1. Immediately, at home, the patient may be given an enema of one (1) tablespoon of Karo syrup in a pint of salium. This may be repeated while awaiting the physician or transportation to the hospital.

2. Adequate glucose for recovery.

ROUTINE HEPATITIS TREATMENT

A. High protein bland diet with emphasis on palatability and high quality of protein. The diet should consist of protein, 150 grams, carbohydrates, 350 grams, and fat, 100 grams (2900 calories). Fat to be from nonanimal sources, that is, milk, dairy products, and eggs. Animal fat is to be avoided.

B. 8 oz. of Protein Milk drink to be consumed after each meal. It may be served with the meal tray. 8 to 10 oz. to be consumed at bedtime. (See formulas below.)

C. All of A and B must be consumed to total 4,000 calories in 24 hours. The staff must be alert to evaluate the food actually consumed by the sickest patients. In these cases the food not eaten must be calculated in grams and the difference between that eaten and 4,000 calories to be given by tube feeding or intravenous glucose. The recommended formulas for tube feeding are those described below, either Doctor Duncan's or Colonel Pruitt's.

D. Fluids to at least 3,000 cc during acute stage especially. If severely anorexic, give both fluid and glucose (10%) by vein. Avoid normal saline as there is a tendency to fluid accumulation in this disease and thereby an increase in liver size.

In the severely anorexic patients one must be alert for the symptoms of hypoglycemia.

E. Brewer's yeast 5 grams (10 tablets) three times daily.

F. Multivitamin tablets 2 - 3 times daily.

G. Liver extract, 2 cc by deep hypodermic injection daily if edema or ascites is present.

H. Vitamin K (Synkavite) 5 grams by mouth daily where indicated, Vitamin K must always be given with two 5-grain bile salt tablets. This vitamin need not be given unless the prothrombin time is prolonged beyond twenty-five seconds. Large intravenous doses of Vitamin K are sometimes effective where oral dosage is ineffective.

I. Choline chloride, 1.5 grams daily, dissolved in about 15 cc or more of water. Methionine in milk provides the cystine necessary for choline to be effective. Present evidence indicates these lipotropic substances are most effective early in the disease rather than during the defervescent stage.

J. Bed rest with B.R.P. for bowel movements, until directed otherwise by the doctor.

K. Sedatives: No morphine or barbiturates. Paraldehyde, 4 - 8 cc, hyoscine or chloral hydrate.

L. On this regime, particularly if the illness has been a protracted one, there may be considerable weight gain on the part of the patient. No attempt at weight reduction should be instituted under six months from the date of the release from the hospital.

M. Criteria for ambulation¹, as modified:

1. At least three weeks bed rest.
2. No hepatomegaly or liver tenderness. Return of appetite and weight gain.
3. Absence of symptoms, especially lassitude, diarrhea, intestinal cramps, flatus, or headache.
4. Normal serum bilirubin for one week, if slightly elevated the direct Van den Bergh must be negative.
5. Bromsulfalein under 5%.
6. Cephalon flocculation negative in 48 hours.

If one of the above is positive, (except 6), keep in bed one additional week.

Ambulations: One hour twice daily, increasing one hour daily until full ambulation at the end of one week. Post icteric liver function tests to be repeated at this time. If normal, one week of full ambulation with passes and repeated function tests before discharge. If normal tests discharge with instructions for the future.

PROTEIN MILK FORMULA

Col. Francis W. Pruitt

Milk	6 quarts
Eggs	24
Ice Cream	4 quarts
Casein, edible, (powdered skim milk or Mead Johnson's Protein Milk or Caseac)	600 grams
Vanilla	5 teaspoonfuls

¹Capps, R. B. and M. H. Barker. The Management of Infectious Hepatitis. Annals of Internal Medicine, Vol 26 - June, 1947, page 405.

Casein, ice cream and one quart of milk are mixed together to form a smooth paste. Lumps of casein must be removed at first mixing.

Then the remainder of milk and eggs are added in a mechanical mixer at slow speed. Chocolate may be used for variety.

Additional sweetening should not be added as it tends to reduce appetite for regular meals.

Usual administration: 8 ounces midmorning and mid-afternoon; 12 ounces at bedtime.

Generally, patients prefer the drink after it has been chilled in the refrigerator.

One 8-ounce glass = approximately 28 grams of protein and 343 calories.

DIET FORMULA

Dr. Garfield G. Duncan

Formula:	P 150	600	Salt Free
	F 144	1296	
	C 400	1600	

3496 Calories

Ingredients:	Household Measure:
Lonalac Powder*	2 1/8 cup
Water	3 1/3 "
Powdered Eggs	1 "
Honey	1 "
Cream	3/4 "
Protenium	3 tablespoons
Brewer's Yeast Powder	6 "

(* Powdered skim milk can be used to replace Lonalac when salt may be included in diet.)

MALARIA

As previously pointed out in The Surgeon's Circular Letter, 1 June 1951, infestation by *P. vivax* will be the cause of most clinical malaria in the Korean campaign, but one must not lose sight of the possibility of infestation by *falciparum*, as this is common among the inhabitants of South China. Usually, a diagnosis of malaria can be made by the average medical officer if a microscope and stain are available. Time should not be wasted in searching for the plasmodium in thin smears. It is suggested that the following therapeutic plan be instituted, based on its effectiveness as indicated below. It is believed that much time can be saved by treating malaria as far forward as felt possible and prescribed by the Eighth Army Surgeon. Camoquine is quite safe and servicemen can be adequately treated on an ambulatory status where *P. vivax* is the causative organism.

The following therapeutic management is suggested:

A. Routine therapeutic regimen:

1. Camoquine (SN 1075). This 4 aminoquinoline drug is effective in a single dose of 10 mg per kg of body weight. Also as the quinoline nucleus is broken the degradation products are toxic to the plasmodia. A relapse rate of 1 to 5% has been reported with this compound. It is non-toxic.

2. Chloroquine. The following schedule is recommended by leading malariologists. Initial dose upon confirmation of the diagnosis - one (1.0) gram followed by one-half (0.5) gram in six (6) hours; then one-half (0.5) gram daily for each of two (2) successive days. Total dose 2.5 grams in three (3) days.

B. Cerebral Malaria:

Quinine Hydrochloride. 0.6 gm (in saline) slowly by vein every hour for three (3) to four (4) doses. When improvement is apparent and patient can swallow, give 0.6 grams every four (4) hours.

C. Relapsing Malaria and Exoerythrocytic Infestation:

Quinine Hydrochloride or) q6h for fourteen
Sulphate - 0.6 gm) (14) days
Pentaquine - 0.01 gm)

Because of the toxicity of Pentaquine and the other eight (8) aminoquinoline compounds, all patients treated by this regimen should be hospitalized. Methemoglobin may occur and the clinician should be on the alert for evidence of toxicity. All attendant personnel should be warned about the administration of sulfa drugs or Atabrine while patients are on this regimen, as both of these compounds will greatly increase the toxicity.

ERYTHEMA MULTIFORME AND ITS VARIANTS

The medical staffs of hospitals in the Far East Command repeatedly encounter syndromes involving the eyes, mouth, genitalia, and skin, with or without systemic manifestations. According to the degree of involvement of the parts just mentioned, these are cataloged as Stevens-Johnson syndrome, Behcet's dis-

ease, or Reiter's disease. These have been described by the authors bearing the name of the disease and other writers have added additional physical findings in subsequent reports. An excellent article has been published recently, (Robinson, H.M.: The Ocular-Mucous Membrane Syndrome, The Medical Clinics of North America; 35:315-331, March 1951), discussing these syndromes as manifestations of erythema multiforme. The following table is reproduced from this paper.

COMPARATIVE STUDY OF SYMPTOMS IN ERYTHEMA MULTIFORME AND ITS VARIANTS					
	Erythema Multi- forme	Stevens-Johnson Diseases	Behcet's Disease	Ectodermosis Erosiva Plurio- ificialis	Reiter's Disease
EYE LESIONS	Conjunctivitis	Conjunctivitis	Conjunctivitis		
	Conjunctivitis, purulent			Conjunctivitis, purulent	Conjunctivitis, purulent
	Keratitis	Keratitis	Keratitis	Keratitis	Keratitis
	Swelling of lids				
	Vesicular con- junctivitis			Vesicular con- junctivitis	
	Vasculariza- tion of cornea				
	Episcleritis				Episcleritis
	Conjunctivitis membranous				
	Symblepharon		Symblepharon		
	Corneal opac- ities				Corneal opac- ities
	Panophthal- mitis	Panophthal- mitis			
		Kerato-con- junctivitis sicca			
			Hypopyonitis		
			Retinitis		
			Uveitis		
			Phlyctenulae		
ORAL MUCOUS MEMBRANE LESIONS	Vesicles and bullae	Vesicles and bullae		Vesicles and bullae	
	Erosions				
	Annular lesions				
	Superficial ulcers	Ulcers in pharynx	Ulcers on lips, tongue, buc- cal mucosa	Ulcers in pharynx	Superficial crusted ul- cers
	Iris lesions				
GENITAL LESIONS (Male)	Pseudomembrane formation	Pseudomembrane formation			Canker sores in mouth
	Nonspecific urethritis	Nonspecific urethritis		Nonspecific urethritis	Nonspecific urethritis
	Balanitis	Balanitis			Balanitis cir- cinnata Inflammation of urethral meatus

GENITAL LESIONS (Female)	Inflammation of urethral meatus				
			Herpes-like vesicles		
	Vaginal ulcers	Vaginal ulcers	Deep vaginal ulcers	Vaginal ulcers	
JOINT LESIONS	Arthralgia		Arthralgia		
	Arthritis		Arthritis	Arthritis, transient	Arthritis, rheumatoid
SKIN LESIONS	Macules	Lesions of erythema multi-forme	Lesions of erythema multi-forme	Macules	Lesions of erythema multi-forme
	Papules			Papules	
	Vesicles and bullae	Vesicles and bullae		Vesicles and bullae	Keratosis blennorrhagica
	Erythema nodosum		Erythema nodosum		Erythema nodosum
			Furuncles		Pustules
			Seborrheic dermatitis		
			Acne-like eruption		
			Hyper-reactivity		Urticaria

While many authors feel that Reiter's disease should be classified as a form of rheumatoid arthritis, there are others who feel that it is a variant of erythema multiforme. Another point in support of the first contention is the fact that keratosis blennorrhagica sometimes seen in Reiter's is more commonly a manifestation of the rheumatoid group. One other differentiation point might be well to keep in mind: Reiter's

and Stevens-Johnson's syndromes usually run an afebrile course while ectodermosis erosiva pluriorificialis is more likely to be accompanied by fever ranging up to 104° to 105° F. Robinson and his group report favorable response with the use of aureomycin therapeutically. They recommend two or three grams as an initial dose, followed by one-half gram every three hours until the symptoms have subsided.

FLUIDS AND ELECTROLYTES IN THE ACUTE STATE Lt Col Bernard I. Copple, MC., Tokyo Army Hospital

A. Shock Due to Acute Blood Loss -

1. Replace volume with volume of blood.

a. If over 1000 cc of citrated blood is given, the patient should receive 10% Calcium Gluconate -- 10 cc for each 500 cc of Blood. This must not be given with the blood but in saline, glucose or other solutions.

2. If the bleeding continues or tends to continue, try to give only enough blood to raise the blood pressure to about 85-90 Systolic. Higher pressure may increase the bleeding.

3. If blood loss is associated with severe plasma loss as in crushing injury, burns or large denuded areas, plasma should be given along with blood in a ratio which should be individualized according to the loss.

4. Approximately 15cc per Kg given at approximately 90 drops per minute is a safe average dose and rate for those patients whose loss is impossible to estimate. This would mean 1000cc for a patient weighing 150 lbs.

5. Up to a certain point reduction in blood volume from blood loss can be compensated for by the body. Tissue fluids are shifted to the plasma, stagnant red cells are mobilized and a rising coefficient of oxygen utilization helps stave off anoxia, but if the blood volume is allowed to fall enough, the body is no longer able to adjust to the deficiency, decompensation sets in, circulation becomes inadequate, even for the vital centers, hypoxia occurs, vital functions are depressed, and in time dangerous irreversible pathological changes ensue. Therefore,

the time element is important if we are to prevent this irreversible stage.

B. Chronic Blood Loss -

1. The body has adapted to a diminished blood volume and will not utilize blood given in excess or a sudden infusion of enough to expand the blood volume to normal. It is best treated with repeated small transfusions.

2. When surgery is indicated the patient must be gotten out of shock by use of whole blood and time. If time and facilities permit, we should measure the blood volume, estimate the normal volume and give enough whole blood to bring the patient within the expected normal range, but at least the patient's hematocrit should be brought to normal. Plasma is of little value in chronic blood loss and saline or glucose only makes these patients worse by increasing the loss of cells and protein.

C. Dehydration -

1. Severe vomiting and diarrhea.

a. Severe cases should have blood, plasma, or both along with electrolyte, water and glucose because their blood volume is reduced often as much as 30%.

b. Replacement of fluid and electrolyte is more important than specific antibiotics or other medication such as antidiarrheal mixtures.

c. Replacement of fluids lost from vomiting and diarrhea ordinarily requires sodium-containing solutions entirely. For diarrhea alone, 1/6 molar lac-

tate in a dose of 60 cc per kg is sufficient for most patients. For maintenance of hydration, sodium-containing solution to equal that lost in the stools plus the daily body requirements as given in the chart below are required. With high obstruction or repeated stomach aspirations, sodium chloride solution should be substituted for the 1/6 molar sodium lactate. In severe cases, potassium chloride-containing solutions are indicated, but are extremely dangerous when given parenterally, especially intravenously, and should only be given by those medical officers who are well acquainted with the use of potassium.

d. Specific relief of the cause is indicated. Stool culture with organism sensitivity is indicated.

2. Severe malnutrition as seen in prisoners of war or cachexia or other severely debilitated patients.

a. Water, electrolytes, protein and erythrocytes are reduced in both amount and concentration. These patients often require multiple small blood transfusions, and relatively small amounts of electrolytes, water, glucose and vitamins. These patients should be fed very small quantities, which can be slowly increased.

D. The Importance of Kidney Function-

1. When the kidney function is normal.

a. Patients in this category may be rehydrated by three different methods.

(1) Giving normal saline subcutaneously as rapidly as the tissues will remove it, while at the same time giving 5% glucose in water intravenously at a rate of 90 drops per minute. This allows the kidneys to selectively excrete and resorb to bring the patient into balance. This method is useful in a situation where laboratory facilities are absent or minimal.

(2) Calculation of CO₂ and blood chlorides plus careful evaluation of the patient clinically as to intake and output and adjustment of any abnormal chemical values. Treatment by this method can be calculated from the table given below.

(3) Chemical analysis for anions and cations by means of a wheat-stone bridge, from which a Gambel diagram is drawn. Again replacement with the quantities needed can be calculated from the table below.

b. Careful clinical evaluation as to fluids lost, conditions of the patient, and intake-output records, is always available and important.

2. Cases in which the Kidney Function is impaired -

a. There are many pathological syndromes which may

be responsible for the impaired kidney function, but from a treatment standpoint they are all alike. Many of these patients who die, do so from over-hydration.

b. Ordinarily these patients require 1,000 cc of fluid per day plus whatever is lost in the urine vomiting, stools, or other abnormal losses. This 1,000 cc replaces that lost through the skin and through the lungs. Loss is increased by fever or abnormally high environmental temperatures. Fluid given is glucose and water unless blood chemistries indicate low sodium, chlorides or proteins. Record of daily body weight and daily intake and output is made. 1/6 molar lactate is given cautiously to help correct the acidosis. Low protein diet, preferably 20 gms a day, if patient can retain nourishment. Daily blood and urine chloride determination as a guide for replacement therapy. Caution: If acute renal insufficiency is due to sulfa drugs, there is a tendency for the tubular epithelium to reabsorb sodium chloride when these patients start to diurese. Cerebral edema and death may occur in this instance, unless the physician is alert.

c. Careful chemical evaluation by means of the wheat-stone bridge is very essential since these patients sometimes have abnormally high concentrations of electrolytes, and sometimes have very low concentrations.

d. If correctly handled 90% of these patients recover, whereas if improperly handled the reverse 90% die.

E. Replacement versus Maintenance in Parenteral Therapy -

1. The most common error made by medical officers is a failure to recognize the difference between replacement and maintenance. Replacement therapy usually requires sodium-containing fluids whereas maintenance therapy requires very little sodium-containing fluids, but larger amount of glucose and water. The tables below are helpful in this respect.

70 kg(150 lb)min/ 24 hrs. WATER AND SALT REQUIREMENTS

Total fluid needed	Salt	Rate
30-50 cc/kg(2,000 cc-3,500 cc)	3-6gm	90 drops/min

Saline: 0.5 gm of salt per Kg will raise the blood Cl 100 Mg%.

60cc per Kg of 1/6 M Lactate will raise the CO₂ about 30 vol%.

All saline, Ringer's lactate, glucose and saline, salt by mouth and one-half of blood or plasma should be counted as saline.

VIRAL AND RICKETTSIAL DISEASES

Lt Colonel Robert Dickerson, MC, Chief, Medical Service, 118th Station Hospital

The viral and rickettsial diseases which are most likely to be encountered in the Far East and which may be diagnostic problems because of their infrequent occurrence in stateside adult populations are as follows:

A. Japanese B Encephalitis (JBE)

B. Poliomyelitis

C. Smallpox

D. Typhus

Each will be summarized below in abbreviated form based on the experience in this command.

A. JAPANESE B ENCEPHALITIS (JBE)

1. Introduction: JBE is a serious arthropod borne virus disease without age predilection (10% mortality in 1950) which occurs mainly in Korea, Japan and Okinawa each year during the period extending from mid-summer to mid-October. Although immunization with chick embryo vaccine is practiced, its value is not conclusive. There is no specific treatment. Pathologically there is a diffuse CNS inflammatory reaction which involves the encephalon in preference to the cord. A significant percentage of individuals who survive the acute state have demonstrable CNS residues which are conspicuous at three months.

2. Clinical Features: The clinical picture is so constant that little difficulty is experienced in diagnosis after a few cases have been seen. In addition to the non-specific headache, nuchal rigidity and temperature of 39°-41°, at least four of the six findings cited below were observed during the acute stage in all patients with JBE which were seen by the writer during 1950 - (over 200 cases).

a. Altered Sensorium: Apparent mental retardation ranges from coma (common) to recognizable apathy and flattening of affect. During delirium, excitement is rare. Apprehension, as seen in polio, is not observed.

b. Mask-like facies are striking: The only other disease in which they are seen so conspicuously is in established Parkinsonism. Its disappearance with defervescence is equally dramatic.

c. Thick speech is arresting: It is flat and toneless, retarded and sounds as if patient were talking with a "mouth full of mush". During coma or delirium this quality of speech persists. The "nasal" speech of bulbar polio is not seen.

d. Coarse eye ball tremor is observed when patient tries to fix his gaze on a stationary object: When his eyes follow a moving test object, the tremor takes the form which has been previously described as a cogwheel pursuit movement of the globes. This eye sign is to be distinguished from nystagmus and pseudo-nystagmus which are unusual in JBE.

e. Usually symmetrical neurogenic paresis (as opposed to paralysis) is apparent in the cranial nerves which lend themselves to clinical testing: It is also present in the areas with cervical nerve innervation and tends generally to lessen in severity in relation to the lower segments of the cord. As a result, the patient is unable to maintain sustained contraction of the muscles of the face and sustained elevation of the shoulders is difficult or impossible. Strength in the hands and arms is bilaterally impaired while power in the legs is reduced to a lesser extent. Of notable significance is the absence of tenth nerve paralysis as seen in polio.

f. Deep tendon reflexes are generally normal or hyperactive unless patient is moribund. This is impressive in the presence of marked paresis and is of differential value in distinguishing the disease from poliomyelitis. Because of neurogenic paresis, muscles tire rapidly with repeated testing or other use and the impression may be falsely conveyed that the reflex responses in a single patient are subject to wide variation. Superficial abdominals are very often hyperactive and are absent but infrequently.

3. Laboratory: During the first week there may be a leucocytosis to 25,000 with moderate elevation of the sedimentation rate. Lumbar puncture reflects a pleocytosis with ordinarily more cells than in polio. Counts have been observed as high as 2,800 with 85% polymorphs. However, there is usually a predominant lymphocytosis of the spinal fluid with initial total counts of from 100 to 700/cu.mm. Elevation of spinal fluid protein (above 45 mg% but less than 300 mg%) is to be expected.

4. Diagnosis: Complete diagnosis requires serological confirmation. Positive complement fixation tests as reflected by a four-fold rise in titre can be obtained in the majority of patients by submission of weekly serum specimens for examination for a period of eight weeks, unless they are reported positive before that time. A significant percentage will not be positive before 6 weeks.

5. Treatment: Antibiotics are of no value except to prevent bronchopneumonia which is the cause of death in fatal cases (not respiratory paralysis). For this reason, dependence must be placed on the following measures.

a. Endotracheal intubation is the only means of assuring an adequate airway and satisfactory bronchial toilet in the comatose patient who has weakened respiratory power (but not respiratory paralysis!) Intra-nasal intubation greatly simplifies patient care in addition to diminishing his dead-air space.

b. Oxygen administered by tube through the endotracheal catheter is a necessity in a considerable percentage of patients but it should be considered as an adjunct to intubation and not vice versa. It is doubtful if cyanosis in JBE is basically more than a result of accumulated broncho-pulmonary secretions.

c. Postural drainage with intermittent elevation of the foot of the bed (not continuous!) is effective in preventing the basilar accumulation of bronchial secretions after intubation as well as before.

d. Prophylactic penicillin, particularly capable nursing attention and maintenance of nutrition and fluid balance are all supportive measures of first importance if patient is to live through the average of seven days it takes for the acute phase to pass. Thereafter begins the process of slow and laborious convalescence which is uneventful in most cases.

B. POLIOMYELITIS

1. Introduction: Poliomyelitis is a dangerous adult disease in this command with a higher fatality rate than is experienced in the United States. Correspondingly, the paralytic form has a much higher incidence than reported non-paralytic polio when compared with Stateside figures. Child dependents are victims as well, but their disease does not vary from the classical descriptions presented in all texts.

Diagnosis may at first be difficult because of the peculiar features of adult polio, plus the fact that the seasons for epidemic JBE and polio very nearly coincide, with the latter continuing to occur sporadically throughout the year.

2. Clinical Picture: The "dromedary" course has been the exception. Instead, patients more often give a history of progressive malaise with developing weakness which may have existed for a long as two weeks. Whereas children with polio are not prone to experience an extension of the involved areas after the first week, this is a frequent occurrence among adult polio cases in this area. A patient with spinal polio at one week may die of the bulbar form a week later. If, on the other hand, an adult survives the acute bulbar form, it is unlikely that the complete recovery described in children will occur. Of further note is usual absence of pain in the involved muscles. Muscle groups destined to become subsequently involved before the acute phase subsides may often be recognized by an increase in local temperature which is asymmetrical and a fine fibrillary tremor of overlying skin.

Very often the diagnosis will be obvious. But there are other patients with the headache, meningismus, positive spinal, and temperature elevation common to all acute infectious CNS syndromes in which the question of JBE is raised. Experience in this command has emphasized the following specific differential points which are summarized in tabular form.

	Poliomyelitis	JBE
Sensorium	Apprehensive or normal	Retarded and dull
Speech	Normal articulation with nasal twang in bulbar form	Slurred - no nasal quality
Facial Appearance	Normal	Flat and expressionless
Muscle Status	Asymmetrical weakness or paralysis - with lower extremities most involved.	Symmetrical paresis or paralysis with upper extremity involvement most pronounced.
DTR's	Diminished or absent in involved areas	Normal or hyperactive bilaterally
Bowels	Distention and abdominal pain frequent	Constipation and abdominal pain unusual
Incontinence	Infrequent. Serious	Very common. Does not significantly alter prognosis

3. Treatment: Treatment is predicated upon an awareness that bulbar involvement may occur relatively late in the disease and that when it does, progression to a stage of respiratory paralysis may occur in six to eighteen hours. This consideration commends the following pattern of treatment.

a. At the first indication of respiratory embarrassment which can be assumed when respirations exceed 26/min or are grossly irregular, patient should be transferred to the bed of the Drinker or Emerson respirator and have the use of the machine explained to him after which a few minutes of a practice run is accomplished. Thereafter, he is removed from the machine and cared for until the hazard is passed - on the respirator bed preferably.

b. Intra-nasal endotracheal intubation is subsequently warranted if deterioration continues. This will assure a free air way for the successful administration of oxygen by catheter and the effective aspiration of mucus as it accumulates.

c. The respirator should then be employed if cyanosis persists. With these preliminary measures, success often attends its use if the patient has not already suffered vital insult from prolonged cerebral anoxia.

d. The other measures of supportive treatment during the acute phase are mainly directed toward preventing pneumonia as outlined under JBE. In conclusion, it is suggested that the recommended use of atropine in such patients is unwise inasmuch as reducing bronchial secretions will promote inspissation. Instead, the washing effect of copious bronchial suction would seem desirable when combined with intubation, aspiration, and the intermittent postural drainage and positioning which is so feasible in a respirator.

C. SMALLPOX: (See page 20)

1. Introduction: Smallpox continues to be reported each year as a significant disease entity in this command, but not in epidemic proportions. Realizing its endemicity in Korea, one must conclude that both public health measures have been effective and that there has been a constant alertness to its clinical recognition.

2. Clinical Features: After an average incubation period of 10-12 days there is an abrupt onset of chills, backache, headache and a temperature of 390-400° C. If the patient is observed early and has been in Korea, malaria will probably be the first impression. There is no rash at this time except for an occasional nondescript macular erythema of the lower body. However, instead of the temperature abating promptly as in malaria, it remains elevated and the patient toxic until the third or fourth day. At that time his temperature begins to decline and maculo-papular lesions appear first on the face, neck and scalp. Shortly thereafter they appear on the upper and then lower extremities. Extremities are emphasized because by comparison, the trunk is spared. Once the skin lesions are established, they evolve according to the same pattern as a primary vaccination (which is quite unaffected by antibiotics). For practical purposes, two groupings of the disease should be recognized in this region. These are:

a. Discrete and Confluent Types: Recognition of these varieties is not usually difficult because of the relatively slow development and evolution of the skin lesions. In distinguishing from varicella, it is useful to remember that although successive crops of vesicles may appear in variola during a two to three day period, they will involve new areas of the body each time, and there will not be new vesicles scattered among the old. Thus, the "uniform stage" ascribed to the lesions of variola refers to their appearance in any one region of the body. It is equally important to realize that the examiner's impression of how deep or how superficial a vesicle is likely to reflect more properly the thickness of the patient's skin. So, the smallpox vesicles in a blonde child are likely to seem superficial on palpation when compared to the varicella lesions of an adult negro.

b. Hemorrhagic Smallpox has little in com-

mon clinically with the other types because death often occurs before development of the classical skin lesions. Instead, the picture suggests a fulminating bacteremia with the presenting signs of toxemia and petechia. The impression may be further reinforced by such rapid deterioration in vital signs as to suggest Waterhouse-Friderichsen syndrome.

3. **Diagnosis:** Recognition of the vesicular forms must depend on awareness and clinical judgment. Verification may be obtained by submitting vesicle fluid to the 406th Medical General Laboratory for serological titration and performance of a Paul's test. Some additional laboratory evidence is available in hemorrhagic smallpox by reason of the leukemoid marrow response which occurs. It is reflected by the presence of immature red and white cells and a thrombocytopenia. Early total white counts of over 50,000 have been described. However, the specificity of this finding is restricted because of its acknowledged occurrence in diverse types of grave bacteremia.

4. **Treatment:** The use of single and combined antibiotic therapy has emphasized that pustulation is not primarily the result of secondary infections. Notwithstanding, as in other grave states, routine prophylactic administration is indicated plus symptomatic measures as warranted. Of considerable practical importance is the fact that the lurid marbled appearance of the patient after desquamation may be obliterated in a few weeks instead of months by daily tolerance doses of ultra-violet to affected exposed areas.

D. TYPHUS:

1. **Introduction:** Although classic epidemic Typhus is known to occur in Japan, Korea, China and elsewhere in the Orient, it has never been a problem among American troops. Scrub Typhus, by contrast, was a disease of military importance to our troops in World War II. Once since then it has occurred in epidemic proportions among occupation personnel. Scrub Typhus is caused by *Rickettsia tsutsugamushi* and is characterized by a primary eschar at the site of the original mite bite, an extensive rash, lymphadenopathy and a febrile course of 2-4 weeks in the untreated case.

2. **Clinical Features:** After an incubation period of one to three weeks, there is an abrupt onset of chills, headache and fever as with classical typhus. In fact, the course of the disease is remarkably similar to that of epidemic typhus excepting for the usual presence of an eschar and lymphadenopathy. Adenopathy is greatest in the region of eschar. The latter fades only slowly and may still be visible as a black scab when convalescence is clearly established. The other features are as in typhus with a leucocytosis, maculo-papular rash developing after five to seven days, CNS depression and severe toxemia.

3. **Diagnosis:** The Weil Felix reaction is the most useful diagnostic laboratory test. In contrast to other typhus fevers, agglutinins appear for the OXK antigens but not for the OX₁₉ and OX₂ strains.

4. **Treatment:** Both chloramphenicol and aureomycin are completely effective. Dose for dose, experience in the Far East has shown that there is a more rapid response to 2 gm aureomycin for 48 hours than to a similar dose of chloramphenicol.

ACUTE BACTERIAL DISEASE (Exclusive of Enteric Infections)

Colonel John T. B. Strode, MC, Commanding Officer, 361st Station Hospital

GENERAL CONSIDERATIONS

Physicians of today have at their disposal an increasing number of specific agents for the treatment of infectious diseases. The general care of the sick patient is still, however, an important part of good medicine and should not be overlooked. The following is an outline of general medical care considered essential in the treatment of acute febrile illnesses.

A. **Rest in Bed:** Experience over the years has demonstrated that rest in bed for patients with acute febrile illnesses is beneficial. This, however, can be overdone and patients should not be kept at complete bed rest except during the acute febrile period of the illness.

B. **Nursing Care:** Fluid requirements are increased during fever and the nurse must give constant attention to the administration of the type and quantities of fluid ordered. A chart of the intake and output of fluid should be maintained. In prolonged illnesses, the maintenance of nutrition is essential; the nurse can be of assistance in urging the patient to eat as well as assisting him with his food.

C. **Diet:** During febrile illnesses, the metabolism is accelerated. In prolonged febrile illnesses, 3000 to 4000 calories per day will be needed.

D. **Fluid Intake:** During fever there is an increased loss of fluid by the body, therefore, an increased fluid intake is required. As a general rule patients whose temperatures are above 102 degrees F. need at least 3000 cc of water per day.

E. **Care of Bowels:** Constipation is common in patients confined to bed. Adequate fluid intake will often control this, otherwise it is necessary to resort to a mild laxative such as milk of magnesia. Enemas are sometimes necessary.

F. **Measures to Diminish Fever:** The question often arises whether such measures as antipyretic drugs or sponging should be used to reduce fever. There are certain disadvantages. Antipyretics produce a fluctuating body temperature with alternate sweating and chilly sensations which are often unpleasant to the patient. A precipitous fall sometimes produces a shocklike state. Furthermore, a patient's temperature is an important gauge of the effectiveness of specific therapeutic measures, which will be obscured by antipyretics. However, when the temperature is excessively high (105 degrees F.) or when delirium is present, attempts should be made to reduce fever. An antipyretic drug, such as aspirin (0.6 gm) may be given and repeated every four hours in an attempt to reduce the fever. Sponging with alcohol or with tepid water is often beneficial. This often gives considerable symptomatic relief.

G. Symptomatic Treatment: Relief of pain by the usual drugs is indicated for the comfort of the patient.

SPECIFIC THERAPY

It is not within the scope of this presentation to discuss all of the ramifications of chemotherapy. However, an attempt will be made to present the practical aspects of chemotherapy, including the antibiotics and sulfonamides. A table of susceptibility of Microbial Pathogens to chemotherapeutic agents is included to be used as a guide.

At this point, I would like to issue a warning against the indiscriminate use of chemotherapeutic agents. There is more and more evidence accumulating in the literature to indicate that sensitivity disease, periarteritis nodosa, frequently follows the administration of the sulfonamides. Everyone is familiar with the allergic penicillin reactions and the eighth nerve involvement with streptomycin. In hospital practice, it is always advisable to attempt to make a diagnosis before the institution of specific therapy.

The following chemotherapeutic agents are available for use, although the supply in some locations may be somewhat limited:

1. Sulfonamides
2. Penicillin
3. Aureomycin
4. Streptomycin
5. Terramycin
6. Chloromycetin

A. Sulfonamides: The sulfonamides are divided into two groups, the absorbable and the non-absorbable. The absorbable are sulfanilamide, sulfadiazine, and sulfamerazine. The non-absorbable are sulfaguanidine and sulfathalidine.

Sulfadiazine is most commonly used in the treatment of acute bacterial infections. For most types of infections, 4-6 gm. per day at four hour intervals is administered. Sodium Sulfadiazine is available for intravenous use in 0.5% concentration.

The principal toxic effects of sulfonamides are hypersensitivity reaction and injury to the kidneys. Hypersensitivity may be manifested by fever, rash, granulopenia similar to those produced by thiouracil compounds and barbiturates.

Kidney damage results from the precipitation of the sulfonamide particularly the acetylated form in the tubules of the kidney. Methods to avoid kidney damage are to maintain adequate output with copious fluids at least 1200 ml per day or to administer sufficient alkali to render the urine alkaline or neutral. The latter can be accomplished by giving 6 to 20 gm. sodium bicarbonate daily. A rare but serious manifestation is acute hemolytic anemia which usually manifests itself within 48 hours of therapy and is characterized by rapid fall in erythrocyte content of blood, icterus, hemoglobinuria and high fever.

A desirable blood level is between 5-15 mg per 100 ml.

The non-absorbable sulfonamides, sulfaguanidine and sulfathalidine are of value in intestinal infections (Discussed under "Dysenteries").

B. Penicillin: Penicillin is available in the following preparations:

1. Crystalline Penicillin G Potassium Salt
2. Crystalline Procaine Penicillin G for aqueous injection.
3. Crystalline Procaine Penicillin G in oil with 2% aluminum monostearate.

The dosage of the above preparations varies with the type of infection treated and will be discussed later under the different bacterial infections.

Toxic reactions from penicillin do occur and manifest themselves as hypersensitivity reactions, characterized by urticaria, edema, arthralgia and fever.

C. Aureomycin: Aureomycin is available for oral and intravenous use. The dosage by mouth is from 1-6 gm. daily at six or eight hour intervals. The intravenous dose is one-third to one-fifth as large as that required for oral use.

There are no serious toxic reactions when given by mouth; nausea, vomiting and mild diarrhea may occur. When used intravenously there is some risk of phlebitis at the site of injection.

D. Streptomycin: Streptomycin is available for parenteral use. The dose varies from 1-3 gm. daily.

The chief toxic reaction from streptomycin is damage to the eighth cranial nerve. Evidence of this is nearly always demonstrable after the drug has been given for a prolonged period of time, e.g. 2 gm. daily for three weeks or more.

E. Chloromycetin: Chloromycetin is administered orally in doses from 1 to 6 gm. daily. This can be divided and given at 6-8 or 12 hour intervals. Its principal use is in the treatment of Typhoid Fever, Brucellosis, urinary tract infections due to Gram-negative Bacilli and rickettsial diseases. There are practically no toxic effects attributed to this drug.

F. Terramycin: Terramycin is available in limited supply. The usual dose is 2 to 3 gm. daily by mouth. This should be divided every 6 to 12 hours. Toxic reactions are similar to those of aureomycin and are characterized by nausea, vomiting and diarrhea. Glossitis is sometimes noted.

DIAGNOSTIC APPROACH TO ACUTE BACTERIAL INFECTIONS

As in any other disease a careful history and physical examination is of the utmost importance in arriving at a diagnosis.

Table Number 1 illustrates the selection of bacteriological specimens for diagnosis.

Having established the causative organism, antibiotic sensitivity studies are done by the laboratory. The "sensitivity" of the organism is expressed as the lowest concentration of the drug which inhibits its growth. There is always some variation in susceptibility of different strains within a given series. Variations of similar order occur in the sensitivities of Gram-negative organisms to aureomycin, chloromycetin, and streptomycin.

The sensitivity of a given organism serves as a useful guide in the management of infectious diseases. It is not necessary to do this in all cases; further-

more, there is only a rough correlation between clinical response to chemotherapy and the result of the sensitivity study. Sensitivity studies should

be done in all cases of bacterial endocarditis and whenever a serious infection is not responding to treatment.

T A B L E I

SELECTION OF BACTERIOLOGIC SPECIMEN FOR DIAGNOSIS

SUSPECTED INFECTION	NATURE OF SPECIMEN	PRESERVATION	LABORATORY TESTS
BRUCELLOSIS	Blood, 15cc, in special blood culture bottle	Shake well. (Keep warm, 37° C.)	Culture for Brucella. Repeat at least twice during pyrexial episode.
	Clotted blood, 5cc, in sterile tube	Keep cool	Brucella agglutination. Repeat in 3-7 days for rise in titer. Follow with brucellergin skin test.
	Biopsy of superficial lymph node in sterile tube	Keep cool	Culture and guinea pig in inoculation for Brucella.
DIPHTHERIA	Laryngeal and nasopharyngeal swabs	Smear on glass slides	Examine for diphtheria bacilli
	Ditto	Inoculate directly to special culture tube (available commercially). Incubate at 37° C. or in vest pocket.	Culture for C. diphtheriae and determine toxin production.
GONOCOCCAL	Cervical, urethral or conjunctival swabs	Smear on glass slide	Examine for gonococci
	Ditto	Place in broth-swab outfit or in special preserving fluid supplied by laboratory. Keep warm	Culture for gonococci
INFLUENZAL (H. Influenzae)	Nasopharyngeal swab	Place in broth-swab outfit. Keep warm.	Culture and antibiotic susceptibilities.
	Blood 15cc., in special culture bottle (if septicemia or meningitis is suspected)	Shake well. Keep warm (37°C.)	Culture and antibiotic susceptibilities.
	Spinal or pleural fluid, if indicated.	If purulent, add 2 drops of 50% citrate	Direct smear, culture, cell count and antibiotic susceptibilities.
PNEUMOCOCCAL	Nasopharyngeal swab	Place in broth-swab outfit.	Culture and antibiotic susceptibilities. If infection is severe, request typing for rapid identification.
	Sputum, if indicated	Collect in sterile glass jar	Direct typing if infection is severe. Culture and antibiotic susceptibilities.
	Spinal, pleural or abdominal fluid, if indicated	If purulent, add 2 drops of 50% citrate	Direct smear, cell count, culture and antibiotic susceptibilities
STAPHYLOCOCCAL	Swab from infected area	Keep cool	Culture for coagulase - positive staphylococci. Susceptibility to antibiotics.
	Blood, 15cc., in special blood culture bottle, if indicated	Shake well. Keep warm (37°C.)	Ditto
	Nasopharyngeal swab, if upper respiratory infection	Place in broth-swab outfit.	Ditto
	Sputum or bronchoscopic aspiration, if pulmonary infection.	Keep cool.	Ditto

SUSPECTED INFECTION	NATURE OF SPECIMEN	PRESERVATION	LABORATORY TESTS
STREPTOCOCCAL	Swab from infected areas	Keep cool	Culture for Group A organisms and do antibiotic susceptibilities.
	Blood, 15cc., in special blood culture bottle	Shake well. Keep warm (37°C.)	Culture and antibiotic susceptibilities
	Spinal, pleural or abdominal fluid, if indicated	If purulent, add 2 drops of 50% citrate	Direct smear, cell count, culture and antibiotic susceptibilities
MENINGOCOCCAL	Nasopharyngeal swab	Place in broth-swab outfit. Keep warm	Culture for meningococcus
	Blood, 15cc., in special culture bottle	Shake well. Keep warm (37°C.)	Culture for meningococcus
	Spinal fluid, if indicated	If purulent, add 2 drops of 50% citrate	Cell count, direct smear and culture for meningococcus

SELECTION OF A CHEMOTHERAPEUTIC AGENT

Table Number 2 of susceptibility of microbial pathogens to chemotherapeutic agents may be used as a guide in the selection of the proper chemotherapeutic

agent or agents.

When the etiology of a disease is known, selection of the appropriate drug does not follow automatically since there is wide variation in susceptibility among organisms of the same or related species.

TABLE 2: TABLE OF SUSCEPTIBILITY OF MICROBIAL PATHOGENS TO CHEMOTHERAPEUTIC AGENTS

Data are principally based on available clinical experience, and to a lesser extent, on in vitro tests. The drug of choice listed may be supplanted as further experience accumulates. Combinations of chemotherapeutic agents often produce additional benefits.

++ = Drug of choice O = No significant activity ? = No data available
+ = Alternative drug V = Significant variation in susceptibility of strains (S) = Sulfones (promizole, promin)
± = Weak activity or inconclusive data

Organism	Diseases or Infections	Penicillin	Streptomycin	Aureomycin	Chloromycetin	Poly-myxin	Sulfonamides	Bacitracin	Tyrothricin	Tetracycline
<i>Streptococcus hemolyticus</i>	Suppurative infections	++	±V	+	+	O	+	+	+	+
<i>Streptococcus viridans</i>	Suppurative infections	++	±V	+	+	O	±	+	+	+
<i>Streptococcus fecalis</i>	Suppurative infections	±V	±V	++	+	O	±	+	+	+
<i>Staphylococcus aureus</i>	Suppurative infections	++V	±V	+	+	O	+	+	+	+
<i>Staphylococcus albus</i>	Suppurative infections	++V	±V	+	+	O	+	+	+	+
<i>Diplococcus pneumoniae</i>	Pneumococcal infections	±	±V	+	+	O	+	+	+	+
<i>Clostridium</i> group	Tetanus and gas gangrene	++	O	?	?	O	+	+	?	?
<i>Corynebacterium diphtheriae</i>	Diphtheria	++	O	+	+	O	O	?	?	+
<i>Bacillus anthracis</i>	Anthrax	++	?	?	?	O	+	?	?	?
<i>Bacillus subtilis</i>	(Rarely infects man)	++	+	+	+	?	+	?	?	+
<i>Neisseria gonorrhoeae</i>	Gonorrhea	++	O	+	+	O	+	O	O	+
<i>Neisseria meningitidis</i>	Meningococcus meningitis	+	O	+	+	O	++	O	O	+
<i>Hemophilus influenzae</i>	Influenzal infections	O	++	+	+	+	+	O	O	+
<i>Hemophilus pertussis</i>	Whooping cough	O	+	+	+	++	+	O	O	+
<i>Hemophilus ducreyi</i>	Chancroid	O	+	++	+	++	+	O	O	++
<i>Klebsiella pneumoniae</i>	Friedlander's pneumonia	O	++	+	+	+	+	O	O	+
<i>Escherichia coli</i> (B-coli)	Suppurative infections	O	++	+	+	+	+	O	O	+
<i>Aerobacter aerogenes</i>	Suppurative infections	O	++	+	+	+	+	O	O	+
<i>Proteus vulgaris</i>	Suppurative infections	O	++	±V	±V	O	+	O	O	±V
<i>Pseudomonas aeruginosa</i>	Suppurative infections	O	±V	±V	±V	++	±	O	O	±V
<i>Eberthella typhosa</i>	Typhoid fever	O	O	+	++	+	O	O	O	+
<i>Salmonella</i> group	Paratyphoid fever, etc.	O	O	+	++	+	O	O	O	+
<i>Shigella dysenteriae</i> and group	Bacillary dysentery	O	+	+	+	+	++	O	O	+
<i>Pasteurella tularensis</i>	Tularemia	O	++	+	+	?	O	O	O	+
<i>Pasteurella pestis</i>	Plague	O	++	+	+	?	±	O	O	+
<i>Brucella</i> group	Undulant fever	O	+	++	++	+	+	O	O	++
<i>Bacterium funduliformis</i>	Suppurative infections	++	?	?	?	?	?	?	?	?
<i>Streptobacillus moniliformis</i>	Haverhill fever	++	?	?	?	?	?	?	?	?
<i>Actinomyces bovis</i>	Actinomycosis	++	O	?	?	O	+	?	?	?
<i>Erysipelothrix rhusiopathiae</i>	Erysipeloid	++	?	?	?	?	?	?	?	?
<i>Treponema pallidum</i>	Syphilis	++	±	±	±	?	O	+	O	±
<i>Treponema pertenue</i>	Yaws	++	±	?	?	?	O	+	O	?
<i>Borrelia recurrentis</i>	Relapsing fever	+	O	++	+	?	O	+	O	++
<i>Spirillum mopus</i>	Rat-bite fever	++	O	?	?	?	O	?	O	?

<i>Leptospira icterohemorrhagiae</i>	Weil's disease	+	?	++	?	?	○	?	○	++
<i>Mycobacterium tuberculosis</i>	Tuberculosis	○	++	±	±	?	+(S)	○	○	±
<i>Mycobacterium leprae</i>	Leprosy	○	+	?	?	?	++(S)	○	○	?
<i>Psittacosis virus</i>	Psittacosis	+	○	++	+	○	±	○	○	++
<i>Lymphopathia venereum virus</i>	<i>Lymphopathia venereum</i>	+	○	++	+	○	+	?	○	++
Prim. atypical pneumonia virus	Prim. atypical pneumonia	○	○	++	+	○	○	○	○	++
Donovan body	Granuloma inguinale	○	+	++	?	?	○	?	○	++
<i>Rickettsiae</i> (entire group)	Typhus and spotted fevers	○	○	++	++	○	○	○	○	++

° Chatton, Milton, Margen, Sheldon, and Brainerd, Henry D.: Handbook of Medical Management, University Medical Publishers, Palo Alto, Calif.

BACTERIAL INFECTIONS

A. Pneumonia: The diagnosis of Pneumonia is made by the history, physical examination and chest X-ray.

ETIOLOGICAL CLASSIFICATION OF BACTERIAL PNEUMONIA WITH RECOMMENDATIONS AS TO TREATMENT:

GROUP	ANTIBIOTIC				
	Penicillin	Streptomycin	Aureomycin	Chloromycetin	Terramycin
I. Specific Pneumonia					
A. Coccal:					
Pneumococcal	I		I		I
Streptococcal	I		I		I
Staphylococcal	Io		Io	Io	Io
B. Bacillary:					
H Influenza		II	I		I
K Pneumonia		I	I	II	II
B Mucosa Capsulatus		I	II	II	II
M Tuberculosis		I/			
II. Systemic Disease with Pneumonia					
E Typhosa				I	
P Tularensis		I	I		II
B Pestis			I		II
Brucella				I	
III. Pneumonia Secondary to Aspiration Atelectasis mixed Infections	II	II	I	I	I

Legend: I - First Choice; II - Second Choice; o - Combined Therapy; / - with P.A.S.

There is much confusion about Penicillin administration due to the variety of preparations available. The relative advantages of the three most commonly used may be summarized briefly as follows:

1. Crystalline Penicillin G (Potassium Salt).

Mode of Administration: Intravenously, Intramuscularly, Subcutaneously, Intrathecally.
Peak Plasma Level: 3.0 units.
Time after Administration: 15-30 minutes.
Total Duration of Therapeutic Plasma Level: 3 hours.
Recommended Interval for Injection: Every 3-8 hours.
Advantages: Cheapest per dose, rapid action, highest peak level with greater diffusion into serous cavities.
Disadvantages: Necessity for frequent injections.

2. Crystalline Procaine Penicillin G for Aqueous Injection.

Mode of Administration: Intramuscularly.
Peak Plasma Level: 1 unit.

Time after Administration: 2 hours.
Total Duration of Therapeutic Level: 24 hours.
Recommended Dosage in Bacterial Pneumonia: 300,000 units every 12 or 24 hours.
Advantages: Fewer injections, most economical for routine hospital use.
Disadvantages: High plasma levels not obtained.

3. Crystalline Procaine Penicillin G in Peanut Oil Containing 2% Aluminum Monostearate.

Mode of Administration: Intramuscularly.
Peak Plasma Level: 0.5 units.
Time after Administration: 1 hour.
Total Duration of Therapeutic Level: 48 hours (In some instances, 96 hours).
Recommended Frequency of Doses for Bacterial Pneumonias: 300,000 units every 24-48 hours.
Advantages: Most convenient for home administration.
Disadvantages: Toxic and allergic reactions to penicillin, procaine or oil, although rare, of long duration.

Oral Penicillin: Oral penicillin is not too satisfactory. A recently introduced compound,

Benemide, offers considerable promise of increasing the usefulness of oral penicillin. This benzoic acid derivative given in 0.5 gm. dosage four times daily, enhances the penicillin blood level as was manifested by Caronamide in much larger doses. Benemide has been combined with a pill containing 200,000 units of penicillin with 0.5 gm. Benemide, taken every six hours; this preparation has produced therapeutic level in the blood.

When pneumonia is complicated by meningitis, empyema, endocarditis or abscess, the low level concentrations provided by procaine penicillin will not provide sufficient diffusion, and frequent intramuscular and sometimes intravenous administration of aqueous crystalline penicillin is indicated.

B. Complications of Pneumonia:

(1) Empyema: Small pleural effusions occur with pneumonia and need no treatment. Many such effusions, though moderate in size, will absorb with continued antibiotic therapy. Larger effusions present a different problem. As long as antibiotic therapy is continued the fluid remains sterile. After this is stopped, the fluid, if it is not absorbed, will become frankly purulent. In patients with persistent large sterile effusions which recur after repeated aspiration, surgical decortication may be necessary. Streptodornase, a potent enzyme, when introduced into the pleural space exerts its fibrinolytic activity on the fibrin coating of the visceral pleura and the lung will expand. There is no longer a place for open drainage or tube drainage of empyema. A majority of empyemas can be treated medically by daily aspiration and installation of 50,000 units of penicillin in addition to high level systemic penicillin therapy.

(2) Lung Abscess: Many small abscesses can be cured by prolonged systemic therapy with penicillin. Some of the larger ones may require surgery.

(3) Meningitis: To be discussed later.

(4) Acute Bacterial Endocarditis: Massive doses of penicillin are required. Chemotherapy should be continued for at least four weeks. Sensitivity studies are indicated.

(5) Purulent Pericarditis: Installation of penicillin into the pericardial sac and adequate systemic administration in high dosage.

(6) Incomplete Resolution: This condition is not too uncommon and should arouse suspicion as to the correctness of diagnosis. Complete study to eliminate the possibility of neoplasm, tuberculous and other chronic lesions should be made. Bronchoscopy and planigraphy should be done.

C. Purulent Meningitis: The clinical patterns of the various bacterial meningitides are so similar that a specific diagnosis is possible only from bacterial cultures of the spinal fluid. The usual clinical picture manifests itself by headache, fever, stiff neck and positive Brudzinski's and Kernig signs. A careful physical examination should be done to determine whether or not there is purulent infection in the ears, nasal sinuses, mastoid, and elsewhere to account for the infection. Spinal fluid should be obtained as soon as possible with extreme care to avoid traumatic bleeding and contamination. The essential data are obtained from

the appearance of the fluid, the pressure, cell count, stained smear of the sediment and bacterial culture. Chemical examinations for protein, sugar, and chloride are also done. It is important to remember that although characteristically polymorphonuclear cells predominate in purulent infections of the meninges, in the first phase there may be as many or even more lymphocytes, such a situation may also exist because of early but inadequate treatment with sulfonamide or an antibiotic.

1. Treatment: The usual supportive treatment is essential.

2. Specific Therapy: Effective therapy is dependent upon identification of the infecting organism and its susceptibility to the various antibiotics. Treatment should not be deferred until this information is available. This is a true medical emergency and treatment should be given as soon as the diagnosis of purulent meningitis is established.

The following is a guide for therapy based on the initial spinal fluid findings:

1. When no bacteria are seen on the stained smear but the fluid is purulent--use sulfadiazine and penicillin until laboratory data is completed.

2. When gram-positive cocci are demonstrated on the smear--penicillin and sulfadiazine should be administered until the organism is identified. If the culture is sterile therapy should be changed only if the clinical response is not satisfactory. Some gram-positive cocci, such as staphylococcus aureus are resistant to penicillin. Sensitivity studies are essential for the selection of the proper antibiotic in these cases.

3. When gram-negative cocci are present--penicillin, sulfadiazine and chloromycetin should be given.

4. When gram-negative bacilli are present--Aureomycin or terramycin, streptomycin and sulfadiazine should be given.

5. When the infecting organism is identified and susceptibility to the antibiotics is known, specific antibiotics can be given and the others discontinued.

Intrathecal Therapy: There is much controversy over the use of intrathecal therapy in meningitis. The consensus of opinion today is that it is rarely ever necessary and should be resorted to only as a last effort in cases not responding to the usual therapy.

Methods of administration of sulfonamides and antibiotics in the purulent meningitides:

Sulfadiazine: 4 gms. by mouth followed by 1 gm. every four hours.

Sodium Sulfadiazine for intravenous use: 5 gms. of a 5% solution of sterile sodium sulfadiazine U.S.P. It may be added to 500 to 1000 cc of 1/6 Molar sodium lactate. This should be repeated every 12 hours if the patient is unable to swallow. A blood level of 12 to 15 mg % is desirable.

Penicillin: 1,000,000 units per day at 4 - 6 hour intervals.

Streptomycin: 20 - 50 mg/kg body weight per day.

Aureomycin and chloromycetin: 50 mg/kg body weight per day at divided 6-hour intervals. Intravenous aureomycin - 25 to 100 mg every 6 hours.

Terramycin: 4 gms. daily divided at 6 hour intervals.

D. Infections due to Gram-Positive Cocci:

1. Pneumococcal Infections: These were discussed in detail under pneumonia.

2. Staphylococcal Infections:

(a) Infections of skin and subcutaneous tissue - boils (furuncles), pustules, and carbuncles - are usually caused by staphylococcus albus.

(b) Infections of the respiratory tract: Staphylococcus aureus is occasionally the etiologic agent of sinusitis and otitis media and may rarely produce acute pharyngitis or tonsillitis. Pneumonia may be caused by staphylococcus aureus.

(c) Infections of Bone: Acute hematogenous osteomyelitis, a disease of children and adolescents, is nearly always caused by staphylococcus aureus. The clinical picture is characterized by rapid development of throbbing pain in the extremity accompanied by fever and leukocytosis. On examination there is soft tissue swelling and exquisite tenderness to deep pressure over the affected bone. X-ray examination during the first few days usually reveals only soft tissue swelling with no bone involvement. Later bone destruction becomes evident followed by proliferative changes. Before antibiotics, the fatality rate was 20%. Since the advent of penicillin the fatality rate is less than 5%.

(d) Miscellaneous Staphylococcal Infections: Acute bacterial endocarditis characterized by irregular fever, chills, petechial hemorrhages, and positive blood culture, multiple abscesses may develop.

Acute pyelonephritis is often caused by staphylococcus aureus.

Meningitis has been discussed with purulent meningitides.

Treatment: Penicillin is the antibiotic of choice in the treatment of staphylococcal infections. Sensitivity studies in severe infections are essential as some strains of staphylococci are highly resistant to penicillin. Adequate dosage may range from 200,000 units to 8,000,000 units daily depending upon the resistance of the organisms.

(a) Sulfonamides have some bacteriostatic effect on the staphylococcus and may be used as adjuvant to penicillin therapy.

(b) Streptomycin inhibits the growth of some strains and may be useful.

(c) Aureomycin and terramycin are effective against certain strains and may be used when penicillin is ineffective.

3. Hemolytic Streptococcal Infections: Aerobic streptococci as a group are among the most important bacterial pathogens for man. Streptococcal infections for convenience may be divided into two groups:

(a) The acute infections:

Tonsillitis, pharyngitis, scarlet fever, erysipelas, puerperal fever and lymphangitis.

(b) Late non-suppurative complications:

Acute rheumatic fever, acute glomerular nephritis becoming manifest two or more weeks after an acute streptococcal infection.

There are many other acute streptococcal infections such as sinusitis, otitis media, mastoiditis, pneumonia, empyema, pericarditis, arthritis and peritonitis. It is not within the scope of this presentation to discuss these in detail.

Treatment: Penicillin and the sulfonamides are the drugs of choice in treatment of streptococcal infections. Penicillin in sufficient concentration is bactericidal to the streptococcus. Here again, there are some strains that are highly resistant to penicillin. Sensitivity studies in severe infections are indicated. The sulfonamides are bacteriostatic against the streptococci and may be used as adjuvant therapy. Aureomycin and terramycin are effective against certain strains and can be used when penicillin is ineffective.

Late Non-suppurative Complications of Beta Streptococcal Infections:

- (a) Rheumatic Fever
- (b) Acute Glomerular Nephritis
- (c) Streptococcal Fever

These conditions are not relieved by specific therapy. Sulfonamides and penicillin, by preventing streptococcal pharyngitis, have reduced the incidence of recurrent rheumatic infections. Patients developing streptococcal pharyngitis should be treated with penicillin to eliminate the streptococci.

E. Infections due to Gram-Negative Cocci:

1. Meningococcal Infections: (Discussed under "Meningitis")

2. Gonococcal Infections: (Discussed under "Venereal Diseases")

F. Infections Due to Bacteria of the Hemophilus Groups:

1. Pertussis. The diagnosis is based on history and the recovery of the organism from the cough plate. Negative bacteriologic findings do not exclude the diagnosis.

Treatment: Terramycin and aureomycin have been reported as being effective in the treatment of pertussis.

G. Influenza Bacillus Infections:

H. influenza meningitis is one of the commonest types of meningitis seen in young children.

Treatment: Streptomycin, the sulfonamides, aureomycin and terramycin have been shown to be effective in the treatment of these infections. Sensitivity studies are indicated.

H. Gram-Negative Bacillary Infections: (Other than the enteric bacilli)

1. Brucellosis: The diagnosis is based on history, positive blood culture, and arising agglutination titre.

Treatment: Aureomycin 3 gms. daily combined with dihydro streptomycin 2 gms. daily has been found effective. Terramycin has also been reported as being effective.

2. Tularemia: The diagnosis is based on the history, physical examination and arising agglutination titre. A titre of 1/80 is significant and this usually rises to 1:640 to 1:5120 during the fourth and eighth week.

Treatment: Streptomycin 0.5 gms. daily for 6 days. Aureomycin, chloromycetin, and terramycin are also useful.

3. Plague: The rat flea, *Xenopsylla cheopis*, is the usual transmitting agent. The diagnosis is usually made by demonstration of the bacilli from a bubo or from the sputum. Blood cultures are usually positive for the *P. Pestis*.

Treatment: Streptomycin and the sulfonamides are effective. Streptomycin - 2 to 3 gms. daily for 6 to 10 days; sulfadiazine - maintaining a blood level of 10 to 20 mg %, should be given simultaneously.

I. Diseases due to Toxin Producing Bacteria:

1. Diphtheria: The diagnosis is based on culture of the organism on Löffler's medium.

Treatment: When the diagnosis of diphtheria is suspected, antitoxin should be given without delay. It is not justifiable to wait for the result of the culture. Antitoxin should be given in the dose of 50,000 units to 100,000 units depending on the severity of the disease.

Penicillin - 300,000 units daily until the throat culture becomes negative for 3 consecutive days.

2. Tetanus: The diagnosis is based on the clinical picture as laboratory examinations are of little assistance.

Treatment: There is no specific treatment.

(a) Sedation: Adequate sedation with paraldehyde, chloral hydrate or sodium amytal to prevent the dangerous acute tetanic seizures.

(b) Antitoxin 300,000 units intravenously and 100,000 units every 3 days if rigidity persists.

(c) Treatment of the local lesion - the same surgical treatment as any other wound.

J. Penicillin Level:

When it is necessary to raise the blood levels of penicillin, Caronamide and Benemide are available in the Far East.

THE DYSENTERIES, DIARRHEAS AND FOOD POISONING

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BACILLARY DYSENTERY

Bacillary dysentery is due to infection with various dysentery bacilli of genus *Shigella*. The three most important species are (1) *Shigella dysenteriae*, which generally causes more severe symptoms since it alone produces a neurotropic toxin as well as an enterotropic endotoxin; (2) *Shigella paradysenteriae* (Flexner's bacillus), which may produce very severe dysentery; and, (3) *Shigella Sonne*, which has given rise to numerous epidemics of comparatively mild dysentery, or in some cases, symptoms similar to those of a salmonella infection. However, each of these groups present variable clinical manifestations and the differences are not always apparent. In most groups of patients mild cases with only a few loose stools and slight fever are numerous. In the severe cases the onset is sudden, with fever, abdominal cramps, and numerous bowel movements, consisting of loose watery, yellow or green stool which may change to the characteristic mucopurulent bloody stool. Prostration and dehydration may be marked in neglected cases. Prompt good treatment almost always results in early and complete recovery.

A. Diagnosis:

The occurrence of diarrhea among troops at any time, especially when stationed where insanitary conditions prevail, should arouse suspicion of bac-

illary dysentery. The bacillary stool shows abundance of cellular exudate made up of large numbers of polymorphonuclear leukocytes, many of which have undergone toxic necrosis and variable quantities of red blood cells. The appearance of the stool of amebic dysentery is very different (see "Amebiasis" for description of the typical stool of that disease). Specific diagnosis, of course depends on finding bacilli in material taken from rectal swabs or in stool cultures.

B. Management:

1. Chemotherapy: Excellent results are obtained with the various sulfonamide drugs.

a. Sulfadiazine - Is the drug of choice. The recommended dose is 2 grams initially followed by 1 gram every six hours. Because of possible kidney damage, this drug should be held in reserve.

b. Chloromycetin, Aureomycin or Terramycin - 2 to 4 grams daily in divided doses may prove effective. Reports on chloromycetin are particularly encouraging but its large scale use has not yet been reported.

2. Diet:

a. In the early stage fluid may be given in

the form of saline solution or clear soup to replace the loss of salt. Albumin water, orange juice, tea with lactose, or rice water may be used for nourishment. Milk should not be given at this time.

b. When the patient is over the initial acute stage, milk, fruit juices, and smooth cereals followed later by eggs, crackers, butter, custards, milk puddings, toast, chicken, and mashed potatoes, may be given.

c. Vitamin supplements particularly B complex should be added to the diet.

3. Other measures:

a. Patients should be at complete bed rest during acute stage. The discomfort and exertion involved in passing stools should be minimized.

b. Purgation and high enemas should not be used.

SIMPLE ACUTE DIARRHEA

Diarrhea is a symptom and not a disease. The causes of diarrhea include enteric infections, food sensitivity, chemical and heavy metal poisons, avitaminoses, toxic or septic states, circulatory disturbances, neoplasms, partial intestinal obstruction, endocrine dysfunction, non-specific infections, emotional disturbances, and numerous other conditions. One should be very hesitant in making the diagnosis of simple diarrhea because of the likelihood of missing a condition which requires specific therapy.

A. Diagnosis:

The exact cause of the diarrheal episode must be determined, if at all possible. Simple acute diarrhea is one whose etiology is unknown. Stools are light brown or gray or green in color, containing flakes of mucous, but void of blood and range in number from 3-4 to 15-20 per day. Nausea or vomiting may be present. The temperature and leukocyte count may be normal or only slightly elevated. Usually prostration is lacking but may occur in the severe forms. An attack is of brief duration usually lasting from one to three days. The diagnosis is thus made on clinical symptoms and by excluding known causes of diarrhea.

B. Management:

1. Laboratory Examinations: If an attack is severe or lasts more than a short period, stool cultures, repeated microscopic studies, and a proctoscopic examination should be performed as well as other tests as indicated.

2. Drugs:

a. Atropine - 0.4 mgm (1/150 grain) every four to six hours may be used for abdominal cramps.

b. Codeine - 0.03 to 0.06 gram (1/2 to 1 grain), demerol 50 to 100 mgm or morphine 0.008 - 0.015 gram (1/8 to 1/4 grain) depending upon the severity of the abdominal cramps, may be used.

c. Chemo and antibiotic therapy - Sulfaguanidine, 6 tablets initially and 3-4 with each succeeding bowel movement will usually control the simple diarrheas.

3. Fluid Balance:

Intravenous fluids and other supportive measures as indicated.

BACTERIAL FOOD POISONING

Food poisoning is an acute illness produced by the ingestion of food which is contaminated with bacteria or bacterial products. The symptoms include uncontrollable vomiting, marked diarrhea, intense abdominal pain, and in severe cases, generalized muscular cramps, vascular collapse and a shock-like state. In an outbreak, all patients will give an identical story of having eaten of the same food and becoming ill with various degrees of the same gastro-intestinal symptoms at almost the same moment.

Bacterial food poisonings are most often due to staphylococcus or salmonella organisms.

A. Diagnosis:

1. Staphylococcus: Staphylococcus food poisoning is caused by a heat stable exotoxin elaborated by this organism. It usually originates from a human source and is present in the food before it is eaten. Foods most frequently involved are cream-filled bakery products, cream-puffs, cream-pie, custards, etc., ham, tongue, and meat loaf. Onset of symptoms usually occurs from one to six hours after ingestion of the offending food.

2. Salmonella: Salmonella food poisoning is an infection of the intestinal tract and at times the blood stream, with one of the more than 200 species of salmonella - no toxins are involved. Infection usually originates from contaminated food or at times, polluted water. Symptoms have their onset in from three hours to three days, but more commonly appear from 12 to 24 hours after ingestion of the infected material.

3. Botulism: Botulism is caused by a toxin elaborated by *C. Botulinus*. The most frequent sources are unprocessed canned foods, such as house cooked canned meats, string beans, etc. This toxin, in addition to being a local irritant, can cause paralysis, which is often not amenable to specific therapy. Symptoms have an acute onset and occur within a few hours after ingestion of the offending food.

B. Management:

1. Treatment of Shock

2. Fluid Balance: Dehydration and electrolyte deficiency must be corrected immediately by the intravenous administration of 5% glucose in normal saline - 3000 to 4500 cc may be required during the initial 24 hours. In some cases it may be necessary to give potassium in addition to sodium chloride.

3. Emptying of Stomach or Cathartics: It is usually not necessary or desirable to empty the stomach or give cathartics as these patients usually will have already eliminated the offending food in the vomitus and bowel movements.

4. Drugs:

a. Atropine - 0.4 mgm (1/150 grains) may be given every four to six hours to relieve abdominal cramps.

b. Codeine - 0.03 gram to 0.060 gram (1/2 to 1 grain); Demerol - 50 to 100 mgm; Morphine -

0.008 to 0.015 gram (1/8 to 1/4 grain), every four to six hours depending on the severity of abdominal distress, may be given for sedation and relief of pain.

C. Specific Therapy

1. Staphylococcus: There are no effective specific measures.

2. Salmonella:

a. Streptomycin - 0.5 gram by mouth four times daily may be given although results have not been encouraging.

b. Chloromycetin - 500 mgm every four hours has been effective in some cases and appears to be the drug of choice at this time.

c. Sulfaguanidine or sulfasuzidine - may be administered in *S. Choleraesuis* infections, however, most salmonella do not respond to sulfonamides. Dose as for Bacillary Dysentery.

3. Botulism:

a. 50,000 units of botulinum antitoxin intramuscularly should be given after appropriate skin tests for hypersensitivity have been accomplished. In general, the results from antitoxin therapy have been disappointing but patients should be given the benefit of such treatment.

b. Enemas may be given to facilitate elimination of toxin retained because of constipation.

c. Vigilant nursing care is essential with particular attention given to the prevention of the aspiration of saliva.

AMEBIASIS

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The severity of amebic infections varies greatly. Many individuals harboring infections have the so-called asymptomatic intestinal form and are symptom free or have only vague complaints which cannot be definitely related to the disease, while others have the dysentery form of intestinal infection which may include various degrees; diarrhea, abdominal cramps, dehydration, anemia, toxicity, or prostration. The disease tends to be chronic with recurrent acute exacerbations. The extra intestinal forms include involvement of the liver, brains, lungs and other organs. The disease is less prevalent than is bacillary dysentery.

The life cycle of *E. histolytica* includes the trophozoite, precystic and cystic stage. The first two mentioned are important as far as the individual clinical case is concerned, but since they disintegrate rapidly upon passing through the intestines they are not important in the transmission of the disease. The cysts, however, withstand long periods outside the bowel and are therefore the means by which infection is spread. The main transmitting agents are the so-called "healthy human carriers" and other infected individuals who handle foods and drink; vegetables grown in fields fertilized by human feces; contaminated water; and flies and other insects carrying cysts.

ASYMPTOMATIC FORM

(Army Diagnosis: "Carrier of *Endamoeba Histolytica*")

A. Diagnosis: Diagnosis of this form is made solely on the finding of cysts of *E. histolytica* in the stool specimens. Symptoms are lacking or, if present, cannot be definitely related to the finding of cysts in the stool.

B. Treatment: Treatment of these patients has often been neglected in the past because of their freedom from symptoms. Since such patients have a disease which may endanger their life it is imperative that adequate treatment be administered.

1. Emetine should not be used in this form of amebiasis since it is toxic and oral amebicides are sufficient.

2. Oral amebicides

(a) Carbarsone - Dose is one 0.25 gram gelatin capsule orally three times daily for seven days. It is contraindicated in hepatic diseases.

(b) Diodoquin - Dose is three 0.21 gram tablets, total of 0.63 gram, orally three times daily for 10-20 days.

(c) Chiniofon - May be used as an alternative for diodoquin. Dose is four 0.25 gram tablets (1 gram) orally three times daily for ten days.

DYSENTERY FROM

(Army diagnosis: "Dysentery, Amebic")

A. Diagnosis: Amebiasis with intestinal symptoms and abnormal stools containing motile ameba, are included in this group.

1. Differential diagnosis: Other protozoal dysenteries, bacillary dysentery, mucous colitis, ulcerative colitis, intestinal tuberculosis, schistosomiasis, lymphogranuloma venereum, mild cholera, and acute appendicitis.

2. The stools of amebic dysentery are liquid, reddish brown in color, and contain shreds of mucous. The finding of motile *E. histolytica* containing red blood cells establishes the diagnosis.

3. Proctoscopic examination often reveals discrete rectal ulcerations. Material from these ulcerations often shows ameba.

4. It is important that the stools and specimens from the rectum be kept warm and examined immediately since trophozoites disintegrate rapidly.

B. Treatment:

1. Amebocidal Drugs:

(a) Emetine hydrochloride - Dose is not to exceed 0.03 gram (1/2 grain) subcutaneously or intramuscularly

twice daily or 0.06 gram (1 grain) once daily during period of diarrhea, but not for more than four to six days. It does not destroy ameba. The patient should: (1) watched closely for toxic effects which include nausea, vomiting, muscular weakness, neuritis, myocardial damage, and prostration; (2) have blood pressure and pulse taken twice daily; (3) have EKG taken before treatment, every two days during and for several days thereafter; and, (4) have drug stopped immediately if toxic effects appear.

(b) Carbarsone - Dose is 0.25 gram three times daily for seven days. Drug should be given before emetine is started, concurrently with emetine, and after the course of emetine is finished. It should not be given to patients with hepatic disease. Toxic symptoms appear infrequently and include nausea, vomiting, and even less frequently, exfoliative dermatitis, and possibly visual disturbances. If carbarsone cannot be given with emetine, diodoquin may be used.

(c) Diodoquin and chiniofon - Dosage is given under treatment of Asymptomatic Form.

AMEBIC HEPATITIS

A. Diagnosis: The diagnosis of amebic hepatitis can only be suspected clinically by the finding of fever, local pain, tenderness, and an enlarged liver. When the clinical signs of amebic hepatitis fail to subside in five or six days the development of an abscess should be suspected. The complement fixation test is very reliable and extremely helpful when a definite history of amebiasis is absent or when intestinal specimens are negative for ameba. Liver function tests will very often show changes indicative of hepatocellular disease.

B. Treatment: Chloroquine diphosphate - This is the drug of choice as the liver concentrates it many times. Chloroquine diphosphate, which is non-toxic, should be used in doses of 0.25 gram four times daily for the first two days then 0.25 gram twice daily for two to three weeks.

AMEBIC ABSCESS

A. Diagnosis:

1. Pain and localized tenderness.
2. Toxic with septic temperature.
3. X-ray may help.

B. Treatment: Emetine as listed in treatment of Dysentery Form.

HEPATIC ABSCESS

A. Treatment:

1. Amebocidal Drugs: Emetine hydrochloride - Dose is same as for Dysentery Form except drug is continued for eight days if toxic symptoms do not appear.
2. Abscess should be drained by aspiration after two to four days treatment with emetine. If rupture of abscess appears eminent, aspiration should not be delayed but emetine should be started and the abscess drained immediately. If abscess is in the left lobe of the liver, surgery rather than needle aspiration will usually be necessary.

ACUTE GASTRO-INTESTINAL HEMORRHAGE AND INTESTINAL PARASITES

Colonel George M. Powell, MC, Chief, Medical Service, Osaka Army Hospital

MANAGEMENT OF UPPER GASTRO-INTESTINAL HEMORRHAGE

There is probably no gastro-intestinal disease which presents such divergent opinions regarding its management. The main differences exist between: initial surgical versus medical management; use of small amounts as against large amounts of blood; and indications for surgical intervention.

A. Diagnosis:

1. Although 85-90% of upper gastro-intestinal hemorrhages are due to gastric or duodenal ulcers, other causes should be considered. Therefore, a careful history, physical examination and pertinent laboratory tests should be accomplished to determine the exact source of bleeding.

2. Other less common causes include: esophageal ulcerations from neoplasms, burns, and varicosities secondary to portal cirrhosis; small-intestinal lesions such as Meckel's diverticula, neoplasms, and injury from passage of biliary calculi; vascular conditions such as hemangiomas and varicosities secondary to cardiac decompensation and portal hypertension; blood dyscrasias including hypoprothrombinemia, leukemia, purpura, hemophilia, and jaundice; infections and toxic conditions such as uremia; other gastric lesions including neoplasms, hypertrophic gastritis, hiatus hernia, vicarious menstruation, and allergy.

3. Any plan of management should, therefore, include procedures to determine the source of bleeding, as well as methods of controlling hemorrhage.

B. Plan of Management:

1. General: No iron-clad rule can be laid down for the management of these cases, therefore, the following is to be used only as a guide.

Most cases can better be handled medically initially with surgical treatment reserved for the exceptional case and when medical measures prove inadequate. However, because of a relatively poor prognosis, specially careful observation as potential surgical candidates should be made in the case of patients with: age over 45 years; first or second hemorrhage; hematemesis; gastric ulcer; over 2500 cc of blood required to restore blood volume to normal; hemorrhage persisting over 24 hours after admission to hospital, recurrence of hemorrhage; and bleeding while following a full medical regime.

2. Specific Measures:

a. Transfusions:

(1) **Massive hemorrhage** - defined as hemorrhage which results in shock or near shock, loss of at least 50% of blood volume, RBC less than 2.5 million, and hemoglobin less than 7.8 grams per cent.

(a) Administer sufficient amounts of whole blood to correct shock within the minimum period of time - usually these patients will require 1500-2500 cc of blood. A reserve of the same amount should be maintained to be used immediately in case rebleeding occurs.

(b) When shock has been overcome as characterized by clinical relief, rise in systolic blood pressure above shock level and decrease in pulse, then speed in administration of blood is no longer required and further blood should be given slowly in amounts necessary to maintain blood pressure, pulse, and satisfactory clinical condition.

(2) Moderate hemorrhage - defined as hemorrhage which results in loss of less than 50% of blood volume, RBC 2.5-3.5 million, and hemoglobin between 7.8-10.0 grams.

(a) Administer blood in small amounts (250 - 500 cc at a time) by slow drip until RCB has been raised to over 3.5 million and hemoglobin above 10.0 grams per cent.

(b) Keep a reserve of at least 1500 cc of blood for immediate use in case bleeding continues or rebleeding occurs.

(3) Mild hemorrhage - defined as hemorrhage which results in mild reduction blood volume, RBC 3.5-4.5 million and hemoglobin 10-12 grams.

(a) Ordinarily it is better that transfusions be delayed in such cases and the patient be observed closely for evidence of further bleeding.

(b) Keep a reserve of 1000-1500 cc of whole blood for use in case bleeding continues or rebleeding occurs.

b. History and Physical: Take a brief history with particular reference to previous ulcer symptoms and other causes of bleeding and perform a cautious but complete physical examination with special attention to eyegrounds, skin, heart, lungs, abdomen, and rectum (including digital examination).

c. Consultations: Obtain surgical consultations as soon as possible and watch patient with surgeon to determine when medical treatment should be replaced by surgery - consider early surgery particularly in patients: in older age group, who continue to bleed, who cannot be controlled by 2500 cc of blood, and who rebleed.

d. Blood pressure and pulse: Should be taken every 30 minutes.

e. Fluid balance: Measure and record graphically the 24 hour fluid intake and output.

f. Laboratory examinations:

(1) Cross match and type for blood transfusion.

(2) Test specimen of feces for blood.

(3) Obtain CBC, hematocrit, urinalysis, and BUN; also, blood chlorides and CO₂ if patient has been vomiting. These examinations should be made at least daily for 3 days and more often if warranted in individual cases.

(4) Obtain coagulation and bleeding times, prothrombin time, and platelet count.

(5) Perform BSP test as a screen for portal cirrhosis.

g. Consider use of an inlying Levine tube to aspirate gastric contents if patient continues to vomit or shows evidence of gastric retention.

h. When patient recovers from shock and vomiting is not present, he should be fed each hour with 3 ounces of 25% cream and 75% milk mixture to which 50 grams of gelatin and 60 grams of dextrose have been added to each 100 cc. If the patient is allergic to milk, the following mixture may be substituted: gelatin - 50 grams; dextrose - 70 grams; juice of three oranges and water to make 1000 cc (this mixture contains 660 calories per liter).

i. Medications:

(1) Do not use amphotel, at least not in large amounts, as it is likely to produce hard stools and result in later fecal impaction.

(2) Ordinarily barbiturates should be used for sedation rather than morphine or demerol.

(3) Administer 20 mgm vitamin "K" intravenously three times daily.

j. X-ray examination: Ordinarily patients should not have a G.I. x-ray examination until ten days or two weeks after the bleeding episode. However in special cases, when surgery is seriously considered and the source of bleeding is unknown, examination utilizing the Hampton technique may be performed.

INTESTINAL PARASITES (See page 14)

It can be safely said that infestation with intestinal parasites is by far the most common medical condition occurring among all peoples in the Far East Command. Military personnel in this area have not escaped. Although no surveys have been made on the incidence it is so great that all soldiers, particularly those with Korean service, are under medical suspicion for intestinal helminthiasis.

A. Diagnosis:

1. The diagnosis first depends on suspicion that any person in this area may harbor intestinal parasites. Symptoms vary from none at all to severe gastro-intestinal disturbances including abdominal discomfort of all degrees, diarrhea, nausea or vomiting, pains simulating any acute or chronic abdominal condition such as appendicitis, peptic ulcer, cholecystitis or colitis. Skin lesions, particularly urticaria are not uncommon, and pulmonary disturbances are found occasionally.

2. An elevated eosinophile count often provides the first clue that parasites are present. Specific diagnosis, of course, depends on finding the ova, larvae, or adult forms in the stool, most commonly, and less often in the duodenal drainage. The most common helminths found are ascaris, trichiura, hookworm, strongyloides, and giardia, but all types have been found.

3. When the diagnosis of intestinal parasites is suspected, repeated stool examinations (and at

times duodenal drainage) should be made. Soft or semi-solid stools are more likely to provide positive results, particularly stools following purges with saline laxatives such as magnesium sulfate and sodium sulfate.

B. Treatment:

1. Ascaris Lumbricoides (Roundworms)

a. Hexylresorcinol:

(1) Light supper and no breakfast prior to treatment.

(2) Administer to adults, 30 cc magnesium sulfate night before treatment.

(3) Give adults 1.0 gram, children 0.1 gram for each year up to five years; 0.6 gram for six to ten; and 0.8 gram for age ten to fifteen, of hexylresorcinol crystoids on empty stomach. Do not allow patient to chew capsules as buccal mucosa may be injured.

(4) Four hours after hexylresorcinol has been given, administer to adults, 30 cc of magnesium sulfate to flush out dead or dying worms.

(5) Withhold food for four to five hours after treatment.

(6) Hexylresorcinol is contra-indicated in presence of gastro enteritis or peptic ulcer.

b. Oil of Chenopodium: Oil of chenopodium is said to be 85 to 90% effective but is considered too toxic to use. A number of deaths have been reported.

2. Necator Americanus, Ancylostoma Duodenale (Hookworms)

a. Tetrachlorethylene: (Tetrachlorethylene is the drug of choice except when ascaris are also present in which case hexylresorcinol should be used. Tetrachlorethylene stimulates ascaris to activity which may result in serious complications.)

(1) Eliminate fats, cream, butter, and alcohol from diet for 24 hours prior to therapy.

(2) Light supper and no breakfast.

(3) Give adults, 3.0 to 4.0 cc, and children 0.2 cc for each year up to 15 years, of tetrachlorethylene in hard gelatin capsule or in skim milk at 0700.

(4) Have patient lie down until after treatment purge is administered.

(5) Administer to adults, 30 to 45 grams of sodium sulfate at 0900 in four to eight ounces of water. (Magnesium sulfate may be substituted, but it may cause mental depression.)

(6) Treatment may be repeated in one week.

b. Hexylresorcinol: (Eliminates 50 to 60% necator and 20 to 30% of ancylostoma, but has the advantage that the treatment can be repeated several days in succession if necessary.)

(1) Give when ascaris is also present.

(2) For methods, see treatment of ascaris.

c. Oil of Chenopodium: Is effective but extremely toxic to some patients.

d. Carbon Tetrachloride: Highly effective but far too toxic to use.

A few hookworms will not cause symptoms so except when transmission is likely to occur it is not essential to eliminate the last few worms, as they will be spontaneously excreted in time. If anemia is present iron in large amounts - 15 grains ferrous sulfate daily or six grams of ferric ammonium sulfate daily may be used.

3. Strongyloides Stercoralis (Threadworms)

a. Gentian Violet: (Said to be about 90% effective.)

(1) Give adults two 0.03 gram (1/2 grain) of enteric coated gentian violet tablets three times daily and children 0.01 gram (1/6 grain) for each year of apparent age daily with meals for 16 days.

(2) Occasional refractory cases respond well to duodenal intubation of 25 cc of a 1% solution of gentian violet medicinal.

4. Enterobius Vermicularis (Oxyuris, Pinworms)

a. General:

(1) Since this is a group infection all members of a family or group should be treated at one time and strict personal and group hygiene, particularly with reference to the cleansing of the hands, should be carried out.

(2) Inflamed and itching skin around the anus should be cleansed with mild soap and treated with borated petrolatum or merthiolate ointment.

b. Gentian Violet: Give adults two 0.03 gram (1/2 grain) enteric coated capsules three times daily and children 0.01 gram (1/6 grain) for each year of apparent age daily, for eight days. Then one week rest and repeat course.

5. Trichuris Trichiura (Whipworms)

a. Hexylresorcinol: Administer as for ascaris infestations.

b. Oil of Chenopodium: Effective but too toxic to use.

c. Carbon Tetrachloride: Effective but too toxic to use.

6. Giardia Lamblia

a. Atabrine: Adult dose is 0.1 gram (1 1/2 grains) three times daily for five days. Course may be repeated as necessary.

7. Cestoids (Tapeworms) including T. Saginata, T. Solium, Diphyllbothrium Latum and Hymenolepis Nana

a. Oleoresin of Aspidium:

(1) Oral administration:

(a) Eat light supper and no breakfast.

(b) Give adults 30 grams of sodium sulfate in eight ounces of water the night before.

(c) Give adults 1.0 to 1.5 cc capsule and children one minim (60 mgm) per year of age in capsule or on a teaspoon with sugar, of oleoresin of aspidum at 0700, 0730 and 0800.

(d) Administer to adults 30 grams of sodium sulfate in 8 ounces of water at 1000.

(e) Examine all stools for 24 hours for heads of worms since cure is not effective if the heads remain attached.

(2) Intubation: (About 100% effective)

(a) Pre-treatment, including purgative, is same as for oral method.

(b) Intubate duodenally on an empty stomach. For an adult, fresh oleoresin of aspidum 4 cc, acacia mucilage 30 cc, concentrated solution

of sodium sulfate 30 cc.

(c) Post-treatment purgative is not required.

(d) Examine stools for 24 hours as for oral method.

b. Hexylresorcinol: May be tried before using male fern in children with hymenolepis nana infections in dosage of 0.1 gram for each year of age up to five years; 0.6 gram for six to ten; and 0.8 gram for age ten to fifteen. (See treatment of ascaris infestation.)

8. Trichinosis

a. There is no specific treatment, purgative may be given in an attempt to flush out worms before they become imbedded in the intestinal mucosa.

b. Bed rest is advised as cardiac and central nervous system complications may appear.

c. Sedatives may be used for restlessness.

d. Fluid balance should be maintained.

ACUTE INTOXICATIONS BY CHEMICAL AND PHYSICAL AGENTS

Major Clarence L. Hartman, MC, Chief, Medical Service, 382nd General Hospital

The large number of potentially poisonous chemical substances to which the individual may be exposed increases yearly with the addition of new drugs, insecticides, and other substances to his immediate environment.

The accidental or intentional inhalation, ingestion, or contact with toxic agents frequently results in an emergency which must be evaluated and treated promptly.

The diagnosis of acute intoxications is often more difficult than the differentiation of many common disease states, and the incidence of suspicion of an intoxication should always be high. For example, in the presence of stupor or coma without an associated temperature elevation, localizing neurological signs or significant blood, urine, and spinal fluid changes, poisoning should be strongly considered.

The immediate removal of any remaining toxic material, and the termination of further absorption is a first principle of treatment.

The stomach is usually lavaged with a large caliber tube. Certain chemicals with corrosive effects produce rapidly developing ulcerations which might be perforated with a tube. However, reduction of the size of the tube and care in its passage will materially reduce these dangers. The liquids used in lavage consist of water or very dilute solutions of neutralizing agents. Saline cathartics are introduced through the tube in order to expedite the removal of any residual material from the intestinal tract.

Exposure to toxic vapors or gases necessitates im-

mediate transfer of the victim to uncontaminated atmospheres, and the employment of resuscitative measures. Manual respiration should be instituted. If proper equipment is available, oxygen should be administered intermittently with positive pressures of less than 20mm of mercury at the rate of twelve to fifteen times per minute. In the presence of any respiratory movements, continuous administration of oxygen at atmospheric pressure by catheter or mask is instituted. The maintenance of a clear airway by proper support of the tongue, and catheter aspiration of accumulated mucus and fluid from the nasopharynx and trachea are essential.

CORROSIVE ACIDS AND ALKALIES

A. Mechanism of Action and Clinical Manifestations:

1. Local irritative effects on the gastrointestinal tract constitute the major problems, leading to complaints of severe esophageal and abdominal pain, nausea, vomiting, and profuse diarrheal stools.

2. Severe respiratory symptoms and manifestation of severe shock complete the picture.

3. Ammonium hydroxide is further responsible for marked central nervous system depression with unconsciousness. Cardiac arrest is frequently noted. Ingestion of oxalic acid induces calcium deprivation with cramps, headpain, and convulsions.

B. Treatment:

1. Acids can be readily neutralized by dilute solutions of alkalies introduced through a stomach

tube. Additional treatment in oxalic acid intoxication requires the use of calcium and magnesium salts in the stomach in addition to the intravenous administration of calcium.

2. In addition, alkalies require large amounts of highly dilute acids through the stomach tube.

PHENOL INTOXICATION

A. Mode of Action:

1. Phenol acts as a powerful corrosive poison on contact with the skin and mucous membranes, and is readily absorbed.

2. Systemic effects including gastrointestinal, central nervous system, and renal appear rapidly as a result of absorption.

B. Clinical Manifestations:

1. The characteristic local lesions of skin and mucous membranes consist of severe burns, with dry white eschars, becoming yellowish brown, and healing with extensive scarring.

2. Convulsions leading to unconsciousness probably are the result of absorption of the agent in the motor and medullary areas.

3. Gastrointestinal complaints range from increased salivation to severe diarrhea.

4. Urine reveals evidences of severe nephritis.

C. Treatment:

1. Following removal of contaminated clothing, skin is cleared with copious flooding by water or the strongest obtainable concentration of ethanol.

2. Gastric lavage is employed with a solution containing 15 gm of sodium sulphate in 500cc of water, and continued until washings are free of phenol odor.

3. Regular measures to combat shock are combined with special attention to the renal changes in the period of convalescence.

METHANOL INTOXICATION

Methanol intoxication has been observed frequently among troops in the Far East Command usually as the result of ingesting "bootleg" Sake or other unlicensed liquors.

A. Mode of Action:

1. Methanol is absorbed as readily from the gastrointestinal tract as ethanol, but its elimination and oxidation are much more prolonged. It may be demonstrated in the blood in small quantities even a week after ingestion in patients with severe intoxications.

2. There are two principal effects:

a. Direct irritation of the tissues occurs from methanol and its metabolic products with its distribution mediated by the water content of individual tissues. Hence, the selective destruction mediate by the water content of individual tissues is observed, particularly intraocular fluid and unmyelinated nerve fibers.

b. The second disturbance is due to the presence of the powerful organic acid resulting from methanol oxidation, which produces severe acidosis requiring strenuous treatment.

B. Clinical Manifestations:

1. The direct irritation of the gastrointestinal tract results in severe nausea, vomiting, and often violent epigastric pain.

2. Dyspnea, cyanosis, blindness, convulsions and death constitute the general effects.

C. Diagnosis:

1. In the absence of an authenticated history of ingestion of methanol, diagnosis may be difficult. Methanol intoxication should be considered in the presence of mental depression, confusion, delirium, and coma. Labored, rapid respirations, sluggish pupils, and hazy disc margins with retinal edema are also helpful. The urine is strongly acid. Methanol blood levels persist.

D. Treatment:

1. Gastric lavage: Lavage with large amounts of 4% bicarbonate of soda solution is indicated, but the Levine tube should be inserted with care because of the frequency of acute gastric ulceration.

2. Aspiration of the nasopharynx and the use of oxygen are indicated in the presence of respiratory distress and frothy bronchial secretions.

3. Shock is combatted by general measures.

4. Acidosis is the major therapeutic problem. Intravenous solutions of sodium bicarbonate sixth molar sodium lactate and glucose and saline should be administered as required.

BARBITURATE INTOXICATION

The unauthorized use of barbiturates is a problem in the Far East command particularly in Japan where they are readily available under a number of trade names.

A. Mode of Action:

1. Barbiturates produce depression of the central nervous system, although they are widely distributed throughout the tissues. The degree of depression is dependent upon the dose administered, varying from mild depression to coma.

2. The only practical difference in action among the drugs is based upon the rate of their destruction in the body rendering them short-acting, long-acting or intermediate in action. Short acting barbiturates are less dangerous because of their immediate effect, while the long acting drug with its latent period permits greater repeated doses, before coma supervenes.

B. Clinical Manifestations (Excessive Dosage):

1. Following the initial onset of sleep; deep coma, collapse, shallow respiration, fall of blood pressure, rapid pulse, cyanosis, and profuse sweating are noted.

2. The corneal and abdominal reflexes are abolished, and the tendon and pupillary reflexes dimin-

ished. Babinski is positive. Grades of severity of the intoxication have been evolved, employing the state of consciousness, tendon reflexes, corneal reflex, swallowing reflex, and pupillary reaction as indices in grade four coma all the reflexes, including the corneal are abolished.

C. Treatment:

The use of picrotoxin is indicated in certain levels of barbiturate intoxication, because of its awakening and life-saving effects.

1. A careful history, including all available information as to type and amount of drug ingested should be obtained along with a careful physical evaluation. The central depression, produced by hypoglycemia anoxia, and opiates, should be ruled out because of the particular danger of analeptic drugs in these conditions.

2. Gastric lavage should be accomplished with tap water, and washing saved for analysis. Catheterization and saving the urine for analysis is important. Measures for treatment of respiratory depression and shock are carried out.

3. In order to differentiate between patients requiring picrotoxin or metrazol medication, and those for whom only supportive care is necessary, an orientation of initial dose of 5cc of 10% metrazol solution should be administered intravenously.

a. If a favorable reaction is observed immediately after injection with partial awakening, coordinated voluntary movements, return of corneal reflexes, increased muscular tone, and favorable respiratory and circulatory reactions, metrazol remains the drug of choice, being continued in the same dose until complete awakening is achieved.

b. If favorable response to metrazol is not observed: 25mg of picrotoxin should be given intravenously, and repeated every 15 minutes in 15mg doses until complete awakening and active reflexes are noted. The dose should be reduced but medication should be continued until patient is capable of performing voluntary acts.

BROMIDE INTOXICATION

Bromide intoxication still presents a problem because it is not controlled from sale and there is a definite cumulative action.

The problem of unsteadiness, dizziness, mental confusion, and varied other psychotic manifestations in the absence of localizing signs should suggest bromide poisoning. Blood bromide determination will resolve the problems. Treatment consists of employing sodium chloride in doses of 10-20gm daily to displace the bromide with the chloride ion.

INTOXICATION WITH MORPHINE AND RELATED ALKALOIDS

The use of narcotics in increasing quantities has become a most important problem in the Far East Command. Heroin is by far the principal drug used for addiction and is supplied in large quantities by smugglers from the Asiatic continent. Morphine addiction is almost entirely limited to older adults who acquired addiction prior to the enforcement of narcotics laws.

A. Mode of Action:

1. Acute intoxication by opium or its derivatives is not uncommon among addicts, persons attempting suicide, or persons given the drug therapeutically, and the action is the same in all cases.

2. Initial effect is depression of awareness of discomfort and pain.

3. Larger doses produce an irregularly descending depression of brain and medulla.

B. Clinical Manifestations:

1. Giddiness, marked euphoria, flushing and pleasant bodily sensations progress to incoordination, coma, and slowing of the pulse and respiration. Initial large dose produces rapid coma, without intermediate changes.

2. Nausea, vomiting, and itching of skin are also prominent in the intermediate phases.

3. Pupils are small pinpoint. Respiratory rate decreases with slow feeble pulse and cyanosis.

4. Considerable individual tolerance and response characterize the effects of these drugs. Patients with severe anemia, hypothyroidism, or adrenal insufficiency are extremely sensitive.

C. Treatment:

1. Early gastric lavage with diluted potassium permanganate solution (0.5 gm per liter of water) saves many of these patients, especially if amounts taken are not too large.

2. In the presence of coma, problem is much more serious and prognosis grave.

a. Gastric lavage should be accomplished with care, because of the danger of aspiration pneumonia.

b. The intravenous administration of 5cc of 25% coramine solution is employed for its awakening effect and repeated at intervals of every few minutes.

c. General measures including warmth and oxygen should be employed and circulatory collapse combatted.

Atelectasis and secondary bronchopneumonia are frequent as a result of reduced pulmonary change. Use of antibiotics is indicated.

CARBON TETRACHLORIDE INTOXICATION

The presence of carbon tetrachloride in refrigerators, insecticide dispersants, fire extinguisher fluids, and commercial dry cleaning preparations makes it a toxic agent of some potential importance.

A. Mode of Action:

1. Toxic reactions may occur as a result of brief exposure to high concentrations of the vapor or from repeated exposures to moderate concentrations, from repeated skin contacts, or direct ingestion.

2. Renal changes consist of necrosis and focal degeneration of the tubules of Henle and distal con-

voluted tubules, due to cortical ischemia. Tubular regeneration may be accomplished in 14 days and treatment is based on keeping the period of oliguria or anuria, knowing that in the end residual renal damage would be slight.

3. Liver cells are marked by fatty degeneration.

4. Myocardial damage is great and ventricular fibrillation may occur.

B. Clinical Manifestation:

1. Inhalation of the vapor may or may not produce immediate effects which consists of headache, dizziness, nausea, abdominal pain and diarrhea.

2. After a latent period either following ingestion or inhalation, oliguria, pressure elevation.

3. Liver damage, with clinical jaundice may be observed.

C. Treatment:

1. General measures include administration of oxygen, artificial respiration, fluid administration, and measures to combat shock.

2. Frequent observation for the appearance of renal changes or evidence of hepatic involvement.

a. In the presence of renal insufficiency, treatment should follow the principles already outlined in chapter

b. Hepatic damage is treated similarly.

CARBON MONOXIDE INTOXICATION

Carbon monoxide is an important widely encountered toxic agent present in high concentrations in wood smoke, gasoline, and diesel engine exhaust, and in artificial illuminating gas.

A. Mode of Action:

Being readily absorbed from the lungs this gas acts by interfering the oxygen transportation mechanism of the blood. It poisons the hemoglobin by forming a compound with it in competition with the compound formed by oxygen, limiting the carrying capacity of the blood for oxygen, resulting in tissue anoxia.

B. Treatment:

As the clinical manifestations are those of gradually increasing asphyxia, oxygen therapy is a rational and effective treatment, aiding in displacing the competing carbon monoxide.

METAL POISONING

A. Mercury Poisoning:

Bichloride of Mercury is most frequently implicated in acute intoxications producing a very severe gangrenous gastroenteritis and a necrotizing nephrosis.

B. Clinical Manifestations:

1. The initial gastrointestinal symptoms consist of vomiting of blood, esophageal anepigastric pain, frequent diarrhoeal stools, severe shock, acidosis, dehydration and evidences of salt depletion.

2. The signs of urinary involvement are delayed appearing in several days. Suppression of urine is accompanied by elevated nonprotein nitrogen.

C. Treatment:

1. B.A.L. (Dimercaptopropanol) is administered in the form of an initial dose of 5 mg. per kilogram of body weight, followed in one to two hours by a dose of 2.5 mg per kilogram. After 4 hours a second dose of 2.5 mg per kilogram should be administered, and in the presence of several manifestations, a third dose of 2.5 mg per kilogram should be given in the first twelve hours. On the second day, two doses of 2.5 mg per kilogram should be used, and on the third day one dose of 2.5 mg is given.

2. General treatment involves the use of intravenous fluids, morphine for pain, heat, and colonic irrigations.

ADVERSE EFFECTS OF HIGH ENVIRONMENTAL TEMPERATURES

The appearance of the adverse effects of heat accumulation is dependent upon the performance of muscular exertion over a sustained period in an atmosphere having a high external temperature and a high humidity.

The stability of body temperature is dependent upon the balance of heat production and heat loss. The failure of one of these mechanisms results in a gain or loss of body heat.

CLINICAL MANIFESTATIONS OF HEAT ACCUMULATION

1. Heat Cramps: Muscle cramps due to salt loss are not only observed in the hot humid environment but are observed under all circumstances involving salt and fluid loss.

2. Heat Prostration: Weakness, temperature elevation, anorexia, headache, abdominal distress, nausea, vomiting and visual disturbances characterize heat prostration.

3. Heat Exhaustion: In addition to the evidences of heat accumulation, various degrees of shock are noted.

4. Heat Stroke: This phase represents failure of the heat regulating mechanism with marked perpyrexia.

A. Treatment:

1. In the presence of heat prostration, and muscle spasm, the use of immediate sedation, ice-bag to head, sponge baths, increased ventilation over the body with fans, increased oral intake of 0.1% solution of sodium chloride, or intravenous administration of normal saline are employed. The temperature, pulse, respiration and blood pressure are checked at intervals until a stable level is attained.

2. In more severe cases, in addition to the above measures, the administration of plasma, 100% oxygen, are carried out.

EFFECTS OF COLD

Consultants Division, Medical Section, GHQ, FEC

Cold proved to be an important disabling stress during the last winter in Korea. Exposure to both wet and dry cold which was responsible for marked morbidity among ground troops, emphasized the importance for protective clothing and the care of the feet. A large number of cases of frostbite were carefully studied and a routine management evolved on the basis of this experience.

The material on the Treatment of Frostbite is presented from part II, Sec. XI, page 30-31, Surgeon's Circular Letter VI, 1 Feb. 1951.

TREATMENT OF FROSTBITE

In order to insure uniformity of classification the following should be used in all cases of frostbite occurring within this command:

- Class 1. Hyperemia
- Class 2. Hyperemia with vesicle or blister
- Class 3. Necrosis of subcutaneous tissue

The following plan of management should be instituted as far forward as possible:

1. No smoking - for all patients.
2. Strict bed rest on all foot cases as ordered by doctor.
3. Keep sheets above knees, or raised above feet.
4. Daily foot paint with zephherin (1:1000 dilution, colorless).
5. Bed blocks as indicated (gangrene).
6. Keep ward temperature down to 78 degrees, or lower.
7. Regular diet.

A. Routine Care on 2d and 3d Degree Involvement:

1. a. Intravenous frostbite solution (FEC) should be started as early as possible and continued at the rate of one flask per 6 hours throughout the chain of evacuation. All cases of frostbite without other injury should receive this solution after 100 mg of heparin¹ (supplied with containers of the solution) has been added, prior to intravenous injection. Cases of frostbite with other injuries should receive added heparin at the discretion of the local medical officer.

b. The 23-gauge needle affords the proper rate of flow and no other needle should be substituted.

2. Penicillin 300,000 units as ordered by doctor.

3. Nicotinic acid 100 mgm t.i.d.

4. Multivitamins X 2 daily.

5. Tetanus toxoid booster 1 cc.

6. Strict bed rest unless ordered otherwise by doctor.

B. Routine Care on 1st and 2d Degree Involvement and Ambulatory:

1. Penicillin 300,000 units daily for two days after admission.

2. Nicotinic acid 100 mgm t.i.d.

3. Multivitamins tablets 2 daily.

4. No restriction on latrine and shower facilities.

5. Patients make own beds and police their immediate areas.

Heparin should be utilized as early as possible after frostbite because of its action as noted in the referenced proceedings. The instructions which will be on each 250-cc flask are quoted below:

INTRAVENOUS FROSTBITE SOLUTION, FEC

A. For Frostbite Cases with Other Wounds:

1. Contents Formula:

12 cc ethyl alcohol
250 mgm procaine hydrochloride
5% glucose in water to make 250 cc

2. Dosage: Contents of this flask (250 cc) repeated every six (6) hours.

3. Instructions:

a. Start treatment as early as possible after each diagnosis.

b. For frostbite cases with other wounds give solution as prepared.

B. For Frostbite Cases Without Other Wounds:

1. 100 mgm heparin will be added to each 250cc of the solution prior to the administration.

2. Make entry on EMT or FMC giving date and hour of each dose. If heparin has been added include entry "heparin added".

3. Caution:

a. Use only the 23-gauge needle provided with the set.

b. In doubtful cases, heparin will be used only at the discretion of the local medical officer.

¹Proceedings of the Society for Experimental Biology and Medicine, May 1950, "Prerequisites of Successful Heparinization to Prevent Gangrene After Frostbite", by Kurt Lange, Limm J. Body, and David Weiner.

TREATMENT OF VENEREAL DISEASES
Medical Section, Japan Logistical Command

A. GENERAL:

1. Uncomplicated venereal disease will be treated on an out-patient duty status. Personnel are to be restricted to their unit areas as long as advisable.

2. The physician making the diagnosis will send a written notification to the soldier's Commanding Officer including diagnosis, date and time to return for further treatment. In case of syphilis, the individual's name will be maintained on the roster until his register is closed or transferred. Where a darkfield, Ducrey, Frei, or Donovan body examination is indicated, the individual will be sent, otherwise the specimen.

3. No penicillin is to be given until a definite diagnosis is made in all cases of penile ulcer.

4. The medical facility making the diagnosis will institute treatment and return the individual to his unit for further treatment and follow-up. Every effort should be made to make a specific diagnosis. A possible exception would be a nonspecific urethral discharge.

5. A 5x8 index card mimeographed for record purposes should be used in all cases.

B. THERAPEUTIC REGIME ON OUT-PATIENT DUTY STATUS:

1. Gonorrhea:

- (a) 0.5 Gm (300,000 units) of penicillin.
1.0 Gm where follow-up is difficult or situation warrants.
- (b) Return on third post-treatment day to determine response to therapy.
- (c) If original smear negative for *N. gonococcus*, the following diagnosis should be made:

Urethritis, acute, nonvenereal, caused by _____.
300,000 units Crystalline G penicillin given.
- (d) Repeat clinical and serologic study once a month for six months.
- (e) No penicillin in patients who also have a lesion suspicious of syphilis until after the diagnosis of syphilis has been verified or ruled out by appropriate measures. If found negative on three successive examinations as well as three successive serologic determinations, treat as outlined in "A" above. Also a follow-up at weekly intervals for the first 30 days and monthly for five months.

2. Early Syphilis:

- (a) Institution of treatment as soon as diagnosis is made; paragraph 9, TB MED 230.
- (b) Ulcerative lesions, extra-genital, and adenopathy should be observed for syphilis.

- (c) Installation making the diagnosis to administer the initial treatment. The referring clinic or dispensary to continue follow-up treatment.
- (d) Installation making diagnosis initiate syphilis observation card, syphilis register and treatment card.
- (e) False positive serology to be managed as provided by paragraph 7d, TB MED 230.
- (f) Possibility of Herxheimer reaction should be borne in mind and explained to the patient.
- (g) Spinal fluid examination should be done at a dispensary or hospital adequately equipped.

3. Latent, CNS, or cardiovascular syphilis. These cases should be admitted to an appropriate hospital for management.

4. Chancroid:

- (a) Every effort should be made to rule out primary syphilis. Repeated darkfields with close scrutiny by the bacteriologist or physician will generally substantiate or rule out a diagnosis of syphilis. A positive diagnosis of chancroid requires a follow-up for syphilis with a weekly STS once a week for one month, then monthly for three months.
- (b) Differential diagnosis:

<u>Chancre</u>	<u>Chancroid</u>
Solitary, round or oval	Ulcers multiple in early disease
Cartilaginous	Soft
Long incubation period	Short incubation period
Erosion	Ulceration
Serous exudate	Base covered by a purulent necrotic grayish exudate
Slow course	Rapid course
Non-inflammatory	Inflammatory erythematous border
Discrete inguinale adenitis bilateral	Often a bubo, usually unilateral

(c) Treatment:

- 1. One gram of streptomycin a day for five to seven days.
- 2. Local and surgical treatment as indicated.

5. Lymphogranuloma venereum:

(a) TB MED 230 for diagnosis.

(b) Treatment:

1. Aureomycin one gram Stat. and 0.5 grams q6h.

2. Sulfadiazine one gram three times daily for 21 days.

(c) Bubos should be aspirated but not incised or drained.

(d) Syphilis should be ruled out by repeated darkfield examination and STS repeated at monthly intervals for three months.

6. Granuloma inguinale:

(a) TB MED 230 for diagnosis.

(b) Streptomycin one gram q6h for five days.

C. Detailed information may be found in TB MED 230 and JLCOM letter, MEDNI 726.1, subj: Management of Venereal Disease on Duty Status, 19 February 1951

DERMATOLOGY

Colonel Franklin H. Grauer, MC, Consultant in Dermatology, GHQ, FEC

Treatment - General Principles*

Most common skin diseases will respond to mild, conservative treatment. Since skin conditions are frequently irritated by over-treatment, leading to disabling complications and prolonged hospitalization, it is recommended that treatment be initiated with drugs and concentrations indicated in this section.

Initial local treatment should be guided by the appearance of the eruption and its stage of acuteness and type.

1. Do not use soap and water on acute or subacute eruptions.
2. Do not use ointments on weeping areas.
3. Do not use ointments between the toes, in axillary and inguinal areas in ambulatory patients.
4. Do not use sulfonamide or penicillin ointments.
5. Do not administer penicillin except in erysipelas, cellulitis, and severe pustular infections.
6. Do not use mercurial and iodine (vioform, etc.) preparations concurrently or immediately following
7. Do not use X-ray or ultraviolet therapy except as prescribed by a dermatologic consultant.

A. PYODERMAS (Impetigo, Furuncle, Secondarily Infected Eczema or Fungus Infections).

1. General

a. The principal etiologic agents are staphylococci and streptococci.

b. The infection may be primary (example: impetigo); or secondary to other eruptions (examples: secondary to scabies, insect bites, dermatophytosis, eczema and dermatitis).

2. Impetigo Contagiosa.

a. Contagious through direct contact, towels, etc. Auto-inoculable.

* For more detailed information on the diagnosis and management of the more common skin diseases, refer to:

Pillsbury, D.M., Sulzberger, M.B., and Livingood, C.S.: Manual of Dermatology, Military Medical Manual, National Research Council, W. B. Saunders Company, Philadelphia, 1943.

b. Predilection for exposed surfaces.

c. Initial lesion is a vesicle which usually becomes purulent, followed by rupture and superficial "stuck on" crust.

d. Treatment

(1) Hospitalize if extensive and advancing under treatment, or if there are more than two cases in the same living group.

(2) Remove crusts gently with soap and water before each application.

(3) Rupture unbroken vesicles and trim the overhanging edges.

(4) Apply bacitracin ointment three or four times daily. Use small amounts of ointment rubbed in thoroughly.

(5) If bacitracin ointment is not available, use 5% ammoniated mercury ointment, half strength quinolor comp. ointment (benzoyl peroxide ointment) or 3% vioform ointment.

(6) When the face is involved, daily shaving is recommended using a sharp razor blade, applying the prescribed antibacterial ointment before lathering with the fingers and after shaving.

3. Ecthyma (Ulcerative Impetigo)

a. Rule out diphtheria.

b. Treatment

(1) Same as impetigo.

4. Secondary Pyogenic Dermatitis (Impetiginous Dermatitis; Infectious Eczematoid Dermatitis).

a. A diffuse purulent infection with multiple pustules with or without crusting.

b. Treatment

(1) In general, treatment is similar to that for impetigo but wet soaks with 1:4000 to 1:6000 hot potassium permanganate or saturated boric acid solution, and careful cleansing of site of involvement are especially necessary.

(2) If extensive or resistant, parenteral antibiotic therapy (penicillin, aureomycin or sulfadiazine) and hospitalization may be necessary.

(3) On subsidence of the infection, treatment of the underlying dermatitis or eczema becomes necessary.

5. Infections of Hair Follicles (Folliculitis; Sycosis Barbae).

a. May vary from superficial follicular pustules to chronic deep involvement which is extremely resistant to treatment.

b. Frequently results from excessive contacts with oil and grease.

c. Treatment

(1) Recognize and treat early. The older the infection, the more likely it is to become persistent and chronic.

(2) Treatment is similar to that for impetigo. Bacitracin ointment less effective than in impetigo, although it is worthy of a trial.

(3) Ung. quinolor comp. (benzoyl peroxide ointment) diluted to half-strength with lanolin and petrolatum should be applied once or twice daily after thorough cleansing with soap and water. If not irritating, may eventually be used full strength if necessary.

(4) 5% ammoniated mercury ointment (twice daily) may be used, but is less satisfactory.

(5) 3% aureomycin ointment in lanolin-petrolatum base often effective when other preparations fail, but should be reserved for more resistant cases.

(6) Shave daily as in impetigo. Thorough cleansing and rinsing of razor in hot water when possible. Avoid common towel.

6. Furunculosis

a. An autoinocuable disease.

b. Treatment

(1) Continuous hot potassium permanganate or boric acid wet dressings, or if preferred, continuous dry heat.

(2) No squeezing.

(3) Do not open until completely "ripe"-make small incision.

(4) Hospitalize for treatment and study if multiple or recurrent, or if on face, in axilla, or in area of trauma.

(5) Penicillin, aureomycin or sulfadiazine is treatment of choice for cases with multiple lesions which do not respond promptly to topical therapy.

7. Ulcers.

a. Any chronic ulcer is ordinarily a subject for hospital consultation.

b. More common on extremities, often due to trauma; stasis an important contributory factor.

c. Study from general medical standpoint. Rule out tuberculosis, syphilis, blood dyscrasias, diabetes and sickle-cell anemia in Negroes.

d. Do careful bacterial cultures, including anaerobic, if possible.

e. Treatment: Same as for ecchyma.

B. ECZEMA-DERMATITIS (Eczematous Dermatitis, Eczema, Plant Dermatitis, Contact Dermatitis, Atopic Dermatitis, Nummular Eczema)

1. General

a. The eruptions listed above are all superficial inflammatory skin reactions in response to chemical or physical irritants or sensitizers (allergens), or superficial inflammations of unknown cause. As a group they constitute the most commonly encountered of all skin diseases.

b. It is often necessary to undertake bacteriologic and mycologic investigations, chemical tests (patch tests), and blood studies, and to make use of psychiatric evaluations to prove that a particular agent is the cause of the patient's dermatitis.

c. Eczematous dermatitis is usually divided into two morphologic and pathologic types, the acute and chronic.

d. Much of the local treatment is the same in all types of dermatitis.

e. Do not increase the erythema, vesiculation, edema and weeping of an acute dermatitis by using strong agents.

2. Contact Dermatitis (Dermatitis Venenata).

a. Caused by contact with external irritants and especially with substances (allergens) to which the particular skin has become hypersensitive.

b. Distribution - On any part in contact with the offending substance.

c. Common causes - overtreatment due to use of preparations too irritating for the type or stage of the eruption in question; plants or any type of vegetation especially the lacquer tree or its products in the Far East Command; clothing especially wool, dyes, footwear; occupational contacts such as oil and grease ("oil sores and boils").

3. Atopic Dermatitis (Disseminated Neurodermatitis, Atopic Eczema).

a. Typically associated with hayfever, asthma, etc., in an individual and/or family.

b. Usually of long duration, beginning in infancy.

c. Distribution - usually localized in antecubital spaces, popliteal spaces, face, neck, dorsa of hands, feet.

d. Usually dry, recurrent and itchy

4. Circumscribed Neurodermatitis (Localized Neurodermatitis; Lichen Chronicus Simplex).

a. Distribution - extensor surfaces of arms and legs just distal to elbows and knees; lateral surfaces of legs.

b. Chronic, itching, thickened, scaly dermatitis.

5. Miscellaneous "Eczemas" of Unknown Origin.

a. Patchy or diffuse.

b. May be acute, subacute, or chronic.

6. Infected Eczema or Eczematized Infections.

a. Combinations with seborrheic dermatitis, impetigo, folliculitis, boils, running ears, draining sinuses, fungus infections (hands and feet, groin, etc.).

7. General Therapy for all Forms of Eczema-Dermatitis.

a. Whenever possible, find and remove causes (especially external agents) by considering localization, and by taking a careful history.

b. If sensitization to an external contact substance is suspected, measures to protect the skin should be taken. In general, the skin should be thoroughly washed with soap and water as soon as possible after contact with a suspected allergen.

c. Patch test to confirm clinical diagnosis in contact dermatitis is made with properly diluted materials held on a normal area of skin usually for 48 hours. The interpretation requires experience. A positive test may occasionally cause the original eruption to flare up.

d. Acute phase: Apply wet dressings or soaks whenever possible. Aluminum acetate solution (Burow's solution) diluted 1:15 to 1:30, conveniently prepared by adding one Burow's solution tablet (Medical Supply Item 1-108-400) to a pint or quart of water, or 1:4000 to 1:6000 potassium permanganate solution, or saturated boric acid solution, or normal salt solution.

e. Calamine lotion or, if too drying, calamine liniment (N.F.) with or without 1/2% phenol.

f. As process becomes subacute, change to zinc oxide paste or, if too drying, zinc oxide ointment or 5% boric acid ointment.

g. Chronic phase: apply the following tabulated in order of increasing stimulating potentiality:

- | | |
|---|------|
| (1) Ichthammol (Ichthyol) | 3% |
| Zinc Oxide Paste | q.s. |
| (2) Coal tar solution (liquor carbonis detergens) | 3-5% |
| Zinc Oxide Paste | q.s. |
| (3) Crude coal tar | 3-5% |
| Zinc Oxide Paste | q.s. |

Apply once or twice daily, cleansing area gently with mineral oil prior to reapplication.

h. Antihistaminics seem to aid in relieving

pruritus and producing sedation in most cases.

8. Chronic Recurrent, Vesicular, Vesicopustular, or Scaly Eruptions of Fingers and Hands (Chronic Recurrent Vesicular Eczema of the Hands and Feet).

a. This "twin" involvement of the hands and feet is a common form, often baffling etiologically, resistant to treatment, and incapacitating. If recalcitrant to treatment and there are many recurrences, the patient is ordinarily to be regarded as unfit for military service.

b. Distribution - palmar surface and sides of fingers, soles and lateral aspects of feet.

c. May be related to any one of the following:

(1) Dermatophytosis ("id") - examine feet.

(2) Focus of infection in tonsils, teeth, prostate, etc.; i.e., "bacterid".

(3) Excessive sweating of hands and feet frequently neuro- or psychogenic in origin; i.e., dyhidrosis or pompholyx, usually worse in warm weather or under conditions of nervous tension.

(4) Food allergy - represents about 5% of cases. Diagnosis made by elimination and/or additive diets.

d. Treatment:

(1) Remember the etiologic possibilities.

(2) Avoid excessive use of soap and water. If possible, prescribe a soap substitute such as phisoderm, dermolate, etc.

(3) Cool hand soaks, especially 1:10 aluminum acetate solution (four Burow's solution tablets dissolved to the quart of water) for 10 minutes or longer twice daily.

(4) If secondarily infected, apply one of the antibacterial ointments following soaks and at bedtime.

(5) If there is no secondary infection, use a bland ointment, especially

Burow's Solution	10.0
Lanolin	20.0
Zinc oxide paste	60.0

(6) When the acute manifestations subside, apply a stimulating ointment as in the treatment of chronic eczema.

(7) If excessive sweating of the hands is a factor, it is frequently beneficial to give tincture of belladonna by mouth. Begin with 15 drops three times a day. Increase the dose one drop per day to saturation and decrease 3 drops for maintenance.

9. Eczema of Legs.

a. Consider possibility of stasis, associated fungus infection of the feet, or sensitivity to uniform as etiologic factors.

b. Treatment.

(1) Calamine lotion, calamine liniment (W.F.), or bandaging with thick layer of zinc oxide paste (Lassar's paste), or application of 1% aqueous solution of gentian violet, or compound carbolfuchsin paint (Castellani's paint).

(2) If there is evidence of sensitivity to uniform, long cotton underwear (available from QMC on recommendation of a medical officer) may be curative.

10. Dermatitis of Scrotum and Perianal Region

a. Treatment

(1) Care in cleansing after bowel movement. Have patient use moistened toilet paper if possible.

(2) Sitz bath in 1:5000 potassium permanganate solution; or 1:1000 silver nitrate solution, one or more times daily if acute.

(3) Calamine lotion or, if less acute, GI foot powder, one or more times daily.

(4) If persistent and severe, refer patient to hospital.

C. SUPERFICIAL FUNGUS INFECTIONS AND INVOLVEMENT OF AXILLA AND GROIN.

1. Fungus Infections of the Feet (Dermatophytosis, Tinea Pedis).

a. It is important to distinguish ringworm infections from contact dermatitis due to footgear, pyogenic infection, and eczema. In ringworm infections there is almost always some involvement of the skin between the toes.

b. Characterized by scaling, maceration and fissuring of interdigital webs of feet.

c. Soles may present scaling and/or scattered or grouped vesicles.

d. Treatment

(1) Acute stage

(a) The treatment of the fungus element should be disregarded until all signs of acute dermatitis or pyogenic infection have disappeared.

(b) Bed rest if the feet are extensively or severely involved.

(c) Either continuous wet dressings during the day or hot foot soaks of potassium permanganate (1:4000 - 1:6000) or boric acid solution or normal saline for twenty minutes three to five times daily.

(d) Calamine lotion containing 1/2% phenol to be applied between soaks and at bedtime.

(e) Drainage of large vesicles by puncture with sharp-pointed curved scissors.

(f) If secondarily infected, apply either bacitracin ointment between soaks and at bedtime, or 1% aqueous solution of gentian violet twice

daily, or 2.5% ammoniated mercury ointment two to three times daily.

(g) If cellulitis and lymphangitis are present, systemic antibacterial drugs (penicillin, aureomycin, sulfadiazine) should be combined with the above local therapy. Systemic penicillin occasionally causes a flare-up of present or past sites of fungus infections with appearance of allergic manifestations (ids) because it "cross-reacts" with the trichophytin.

(2) Subacute stage (after weeping and crusting subside).

(a) Apply fungicidal ointment (Medical Supply Item 1-209-180) or compound carbolfuchsin paint (Castellani's paint) at night.

(b) Apply zinc undecylenate foot powder or GI foot powder every morning.

(c) Continue foot soaks, preferably potassium permanganate, as long as fresh blisters are appearing.

(d) Remove tops of blisters and macerated skin with curved scissors or curette. This is essential to rapid improvement.

(3) Chronic stage (dry, thickened, scaly interspaces and soles).

(a) Apply fungicidal ointment or tar compound ointment (Medical Supply Item 1-470-300) or one-half strength Whitfield's ointment every night and remove in the morning.

(b) Apply foot powder liberally every morning and rub in thoroughly to insure contact. Dust powder into socks and shoes.

2. Tinea Versicolor

a. Light brown, superficial scaly patches, usually on upper trunk and asymptomatic.

b. Treatment: Apply 20% aqueous solution of sodium thiosulphate twice daily.

D. ERYTHEMA MULTIFORME AND VARIANTS

1. Discussed on page 25

E. SCABIES

1. Scabies is highly transmissible and has been an important source of loss of man-days in all past wars. It is transmitted through bodily contact or infected clothing.

2. There should be no difficulty in recognizing the typical case. Scabies should be considered in every man who has an itching eruption, especially if the hands and genitalia are involved. The typical primary lesion is a small, tortuous burrow with a tiny vesicle at one end. Excoriation, crusting and secondary infection tend to obscure the primary lesions. On the penis and scrotum the lesions commonly are infiltrated papules. The diagnosis is sometimes difficult in men of good hygiene as the lesions may consist only of scattered excoriated or urticarial papules.

3. Treatment: The simplest and most effective treatment of scabies is:

a. Ambulatory dispensary treatment of the patient, employing Insecticide, Spray, Delousing, Quartermaster Item, Stock No. 51-I-310. The concentrated preparation is diluted with five parts of water before use and the resultant emulsion then contains Benzyl benzoate 13.6%, DDT 1.2%, Benzocaine 2.6%, "Tween 80" 3.0%, and water, to make 100%.

(1) Apply to entire body except head. A warm soapy bath prior to treatment is desirable when practical, although it is not absolutely essential. The solution may be best applied by a gauze compress, cotton sponge, or if individual is treating himself, simply by pouring it into his hands and rubbing it on. The solution should be shaken thoroughly before using. Be sure the treatment is thorough. It may also be applied by hand sprayer Stock No. 41-S-4105, Sprayer, Insect, Continuous, 2-quart. The eyes should be protected during application. Treat apparently unaffected areas first and affected areas last. It is important not to bathe or wash the hands for at least 24 hours and preferably not for two or three days following treatment. The lotion should be reapplied to the hands and arms each time it is found necessary to wash them during this period. Daily reapplication to other parts of the body should be avoided, since irritation may result. If a second treatment is required, it should not be given earlier than 10 to 12 days after the first.

(2) After completion of treatment, patient should wear only new clothing or clothing which has been disinfected.

b. The medical officer who discovers a case of scabies should notify the patient's commanding officer.

c. In diagnosing a relapse, it is important to remember that frequently primary lesions remain visible and irritating for several days after treatment. Patients having irritation because of treatment or persistence of itching because of habit, will improve gradually over a period of several days. Patients who have incomplete treatment will usually have a recurrence of symptoms within one to two weeks after treatment and symptoms will increase.

d. Persistence of symptoms following adequate treatment is due to varying degrees of irritation incident to treatment. In these cases, mild anti-pruritic lotions such as calamine lotion may be prescribed. Under no circumstances will benzyl benzoate be continued for longer than the prescribed time and when a relapse is diagnosed, retreatment with benzyl benzoate should not be administered until at least 10 to 12 days have elapsed since the first treatment.

F. INSECT BITES

1. Most frequent cause for annoyance in Korea is the flea.

2. Produces a grouped, itching, urticarial, papular eruption, some papules of which contain a central red punctum and vesiculation. Eruption may simulate papular urticaria.

3. Sites of predilection - the waistline, hips, shoulders.

4. Prophylactic measures.

a. Flea control can be accomplished by thorough scrubbing of floors with DDT to prevent breeding in dirt and debris in cracks.

5. Treatment.

a. To relieve the itching and discomfort associated with insect bites, the antihistaminics by mouth and the external application of 1% phenol, 1/4% menthol in calamine lotion is helpful.

b. If secondarily infected, treat as a pyoderma.

G. PEDICULOSIS

1. Pediculosis Pubis (Crabs)

a. Usually seen in pubic region, but on hairy individuals crabs may be scattered over the entire body.

b. Treatment.

(1) Dust affected parts thoroughly with insecticide powder (QM issue) twice, with an interval of one week between applications. If this treatment proves inadequate, dust affected parts daily for five days.

2. Pediculosis Corporis

a. Intense itching, more prevalent over upper back and waistline.

b. Lice are usually not found on the skin; look for lice in seams of clothing.

c. Linear excoriations over back, shoulders and waistline from scratching.

d. Treatment. Delouse with DDT powder, employing insecticide, spray, delousing, as used in typhus control.

H. SEBORRHEA, PSORIAS AND PLANTAR WARTS

1. For management, reference is made to standard texts.

I. PITYRIASIS ROSEA

1. An acute disease characterized by oval pink, scaly patches, with the long axis of the lesions paralleling the ribs.

2. Sites of predilection - trunk, upper arms, thighs.

3. In many cases a single (herald) patch precedes the generalized eruption by a week or ten days.

4. Self-limited, duration six to eight weeks.

5. Treatment

a. Apply calamine liniment (N.F.) containing 1% phenol, 3% coal tar solution (Medical Supply Item 1-143-010) two or three times daily.

b. Tanning doses of sunlight or, if available, suberythema ultraviolet irradiation two or three times a week.

c. If b. above not available, apply a. above during day and one-half to full strength tar compound ointment at bedtime.

J. HEAT RASH

1. Treatment

- a. Keep as dry and cool as possible.
- b. Avoid highly seasoned foods and alcoholic drinks.
- c. Increase sodium chloride intake.
- d. Bathe with cool water only - avoid soap.
- e. Apply GI foot powder liberally as needed to affected areas, or
- f.

Chloral hydrate	16.
Camphor	16.
Menthol	8.
Salicylic acid	4.
Glycerin	30.
Zinc Oxide	160.
Alcohol q.s.	1000.
or	

g. If skin is dry, keep lubricated with cold cream or a cream of equal parts of hydrophilic ointment, USP (Medical Supply Item 1-229-675) and distilled water.

K. CARE OF THE FEET

1. The following are suggestions relative to the care of the feet in the field after long marches.

- a. Wash the feet in cold water; after drying, use Army food powder.
- b. If the skin is tender, bathe the feet in warm salt water or alum water; if the feet are swollen and perspiring, soak them in a 2% solution of formalin; if they are very tender soak them in a 1% solution of formalin or a 1:5000 solution of KMnO_4 .
- c. Open blisters with a sterile needle and circle them with rings of adhesive tape to lessen pressure.
- d. Dry and stretch the shoes.
- e. Wash and dry the socks.
- f. The importance of a foot bath with soap and water cleansing, vigorous massage (20 minutes), dry socks, and a change of shoes in the prophylaxis of foot disability resulting from exposure to cold and moisture cannot be overemphasized.

2. Management of Hyperhidrosis of the Feet in Divisional Areas.

a. Prophylactic measures in the form of good hygiene are of first importance and consist of:

- (1) Cleanliness by frequent and careful washing of the feet and frequent changing of socks.
- (2) Dryness by careful wiping especially between the toes after each bath, at the same time taking care not to injure the toe webs by violent rubbing.

(3) Aeration by removing boots and socks on every possible occasion when practicable.

(4) Elevation of the feet by lying down during rest periods so as to relieve hypostatic congestion.

b. Treatment consists of the application of a foot powder containing 5% paraformaldehyde in talcum which is to be dusted twice daily freely between the toes and on the soles of the feet and rubbed in thoroughly to insure contact. The socks should be changed at these times.

c. If the above measures fail to keep the feet sufficiently dry, the soles in addition should be painted once daily at bedtime with 4% formaldehyde (10 cc of Stock No. 1-205-000 Formaldehyde Solution, U.S.P. to 90 cc of water) with a cotton applicator and permitted to dry. These therapeutic measures should not be employed if there is marked fissuring or denudation. This treatment should be discontinued immediately if signs of dermatitis should develop. They should be replaced, after the dermatitis has subsided, with a paint containing tannic acid 10 gm., castor oil 10 cc., alcohol 95% 90 cc., and a foot powder containing 25% exsiccated potassium alum and 75% talc.

3. Management of Hyperhidrosis of the Feet in Hospitals.

a. Hyperhidrosis of the soles of the feet frequently causes a condition described as symmetrical lividity of the soles" which has to be considered in the differential diagnosis of wet foot problems. It is manifested by white plaques surrounded by erythematous or lilac halos on the bottom and sides of the heels, along the lateral border of the sole, or sometimes on the bulbs of the toes, especially where they rub together. Occasionally they are seen on the ball of the foot. In some cases they appear only after marching and disappear after rest. The lesions are apparently due to friction over an area macerated by sweat. The men often refer to them as "scalds" and they may be as tender as first degree burns. Hyperhidrosis is frequently associated with flat feet and foot strain seems to be one etiological factor. Bad hygiene can be recognized as responsible in some cases. Many of these patients perspire excessively also on the hands and their sweating is probably neuro- or psychogenic. Some show intense congestion of the feet, and in such cases, the hyperhidrosis may be secondary to peripheral vascular disease. None of these causes are easy to control even if detected. Symptomatic treatment adjusted to the severity of the case will often give relief though it rarely results in permanent cure.

b. In cases with much inflammation, the feet should be soaked in a foot bath containing 4% potassium alum (Stock No. 1-059-000 Aluminum and Potassium Sulfate) for 20 to 30 minutes twice daily or more frequently depending upon the severity. Following the alum bath, the denuded areas which frequently develop on hyperhidrotic feet should be dressed with an ointment containing 10 to 20% tannic acid in a "Carbowax" (a polyethylene glycol) base. Bacitracin ointment should be applied in place of the tannic acid ointment for several days if secondary bacterial infection is present.

c. After the acute symptoms have subsided, 4% formaldehyde (10 cc of Stock No. 1-205-000

Formaldehyde Solution, U.S.P. to 90 cc of water) should be painted on the soles with a cotton applicator one to three times daily. Formaldehyde should not be used if there is marked fissuring or denudation. Formaldehyde painting should rarely be continued daily for more than a week or two. It may be followed by a paint containing tannic acid 10 gm., castor oil 10 cc., alcohol 95% 90 cc. If this is not effective the formaldehyde painting should be continued once or twice a week.

d. As the condition improves and the frequency of the painting is reduced to once a day preferably at bedtime, a foot powder containing 5% paraformaldehyde in talcum should be dusted once daily preferably in the morning freely between the toes and on the soles of the feet and rubbed in thoroughly to insure contact.

e. The formaldehyde paint and paraformaldehyde

foot powder should be discontinued immediately, if signs of dermatitis should develop. They should be replaced after the dermatitis has subsided with the tannic acid paint and a foot powder containing 25% exsiccated potassium alum and 75% talc.

f. During hospitalization in addition to topical therapy, it is frequently beneficial to administer tincture of belladonna by mouth provided there is no contraindication. Begin with 15 drops of this drug three times a day. The dosage is then increased one drop per dose per day, until the patient begins to notice difficulty in visual accommodation or experiences dryness of the roof of the mouth. At that point the dose is decreased about three times and this lower dosage is then maintained until completion of treatment. Many patients after having been given atropine for a period of time, are able to discontinue taking the drug for varying periods with prolonged relief from hyperhidrosis.

PERCENTAGE OF U. S. ARMY WOUNDED WHO
SUBSEQUENTLY DIED AS RESULT OF THEIR WOUNDS

(Wounded or injured in action. Includes deaths from wounds but does not include deaths in action or death while prisoner of war.)

<u>War</u>	<u>Time Period</u>	<u>Per Cent</u>
Spanish-American	May 1898 - Dec 1898	6.7
Philippine Insurrection	Jan 1899 - Dec 1902	7.8
World War I	Apr 1917 - Dec 1918	8.1*
World War II	Dec 1941 - Aug 1945	4.5
Korean Conflict	Jun 1950 - Mar 1951** (Incl.)	1.87***

* Excluding gas casualties

** The first ten months of the war

*** This represents cases reaching hospital. If all cases are counted, that is, to include those who die before reaching hospital, this figure would be 3.4, which is still the lowest ever experienced by the U. S. Army in war. The data for wars prior to the Korean conflict are from the Medical Statistics Division, Surgeon General's Office, as quoted in New England Journal of Medicine for 19 April 1951.

3

Surgery

The purpose of the Surgical section of this symposium is to present information on the care of battle casualties which will be of value to the medical officer assigned to the Far East Command. It is not intended to be a complete treatise on all of the vast ramifications of war surgery, but is simply a guide to assist the surgeon in becoming oriented as rapidly as possible to some of the pertinent and important principles of Military Surgery.

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NOTES ON THE CARE OF BATTLE CASUALTIES

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Since medical officers are responsible for the adequate treatment of the wounded resulting from the Korean conflict, it is absolutely necessary that the priceless information and experience gained from the care of the injured in previous wars be reviewed. Many will be engaged in the treatment of the wounded without previous experience in this type of surgery. The material about to be presented will be of inestimable value to them. It will also remind the more experienced surgeons of some of the lessons learned and perhaps forgotten by them.

"Notes on the Care of Battle Casualties" was published in March 1945 by the War Department. It is an excellent guide for the military surgeon, written by eminent authorities. Very little has occurred since 1945 to alter the basic concepts set forth in the "TB MED 147."

The original TB MED 147, as amended, and other literature on military surgery, may be consulted for more detailed information. Care of Battle Casualties is presented here in outline form for the convenience and ready reference of the surgeon. Some additions and modifications have been made, based on experience obtained in the Korean campaign. Deviation from these concepts usually results in complications and even disaster.

Surgery of war is not entirely molded by concessions to the need for haste and confusion in caring for large numbers of patients. Military surgery is a development of the science of surgery to carry out a specialized and highly significant mission.

Technical procedures must be placed properly in time and space. Factors which influence these are the tactical situation, the welfare of the patient, the surgeon and the location of the hospital, and

the surgeon's relationship to other surgeons and to other hospitals in the overall care of the patient.

The military effort must not be impeded and unforeseen harm done the patient by doing an operation at the wrong time and in the wrong place.

I. Phases of Surgical Management:

A. Medical Aid - Divisional Area:

1. Control of hemorrhage

- a. Pressure dressing.
- b. Tourniquet: For arterial and not venous bleeding.

- 1) Low as possible
- 2) Mark record plainly
- 3) Release at half hour intervals
- 4) Replace by pressure dressing as soon as possible

2. Resuscitation

- a. Clear airway
- b. Plasma
- c. Serum albumin. Dilute in 5% glucose in water. 1 serum albumin to 5 isotonic fluid.
- d. Whole blood

3. Dressings

4. Splints

5. Narcotics; judiciously, without over medication. Intravenously, if possible. Small dose 10-15 mgm. (1/6 - 1/4 gr).

6. Tetanus toxoid booster

7. Render transportable

8. Institute antibiotic therapy

B. Initial Surgery - Advanced Surgical Hospital Close to Division Clearing Station:

1. Continue resuscitation to obtain:
 - a. Rising blood pressure. 80 mm Hg as baseline.
 - b. Slowing pulse
 - c. Improving color
 - d. Slackening thirst

Further notes on resuscitation:

2. Profound shock
 - a. Blood loss 3000 - 3500 cc in healthy young males. (For practical purposes)
 - b. Failure to respond may be associated with these complications and should be treated.

- 1) Atelectasis
- 2) Tension pneumothorax
- 3) Concealed hemorrhage

- a) Chest
- b) Peritoneum
- c) Thigh
- d) Retroperitoneal

- 4) Cardiac tamponade
- 5) Severe infection

- a) Peritonitis
- b) Clostridial infection

- 6) Fat embolism
- 7) Cerebral malaria

c. Intra-arterial transfusion

- 1) Not responding to other therapy
- 2) Venous system filled or plethoria
- 3) Bypasses lesser circulation and provides blood for coronary arteries
- 4) Calculated risk - may be followed by ischemia
- 5) Manometer in system - 120 mm mercury

3. Prevent/eradicate wound infection as part of resuscitation.

4. Operation - may be necessary before complete resuscitation.

- a. Internal hemorrhage
- b. Spreading peritonitis
- c. Anaerobic infection

5. Transfer to other hospital for further care with minimal delay.

C. Reparative Surgery: Communication Zone Hospital

1. Ideal time, 5 to 8 days
2. Closure soft part wounds which appear clean on inspection.
3. Reduction of fractures and immobilization by whatever means necessary for bony union.
4. Shorten period of wound healing.
5. Earliest restoration of function and return to duty.

6. Return of patients forward or dispatch to ZI.

- a. Earliest feasible time
- b. Best condition possible
- c. Minimal disability and deformity

7. Period of nontransportability for many may be 10 to 12 weeks.

D. Reconstructive Surgery: Zone of Interior Hospitals

1. Peripheral nerve repair
2. Treatment of traumatic aneurysm except those with indications for emergency surgery and arteriovenous fistula, emergency surgery rarely necessary.
3. Definitive treatment of major long bones
4. Bone grafts
5. Definitive plastic surgery

II. General Principles of Initial Wound Surgery

A. Fresh Wounds:

1. Adequate examination including X-Ray examination.

2. Adequate preparation of the part such as shaving liberally, etc., to make counter incisions.

3. Adequate assistance, instruments, light, and position of patient.

4. Bold skin incisions without sacrifice of skin. Parallel with long axis in extremity wounds.

5. Incision fascial layers for inspection, excision of devitalized tissue, and removal of foreign bodies in the wound.

6. Gentle technique.

- a. Fine hemostats
- b. Fine ligatures
- c. Gentle sponging by pressure

7. Anatomical counter-incision for complete debridement of perforating extremity wounds between muscle layers with careful regard to vascular and nerve supply (when indicated).

8. Saline irrigations or none at all, not antiseptics.

9. Fine mesh gauze to keep wound open but without packing to interfere with drainage.

10. Proper dressings and splinting with casts bivalved or split to skin for transportation.

B. Old Wounds, 48 Hours or Longer:

1. Principles same as above.
2. Selected cases improved prior to surgery

by:

- a. Immobilization
- b. Antibiotics
- c. Repeated blood transfusions

3. Consideration given to:

- a. Immediate drainage of septic hematomas and large abscesses
- b. Excision of necrotic muscle
- c. Immediate surgery in anaerobic cellulitis and in clostridial myositis.

III. General Principles, Reparative Wound Surgery

A. General Considerations:

1. Ideal time, 4 to 5 days after initial surgery.
2. Original dressing in operating room when feasible.
3. X-rays at hand.
4. Removal of previously overlooked devitalized tissue and foreign bodies if in wound or interfering with function.
5. Close wounds properly prepared.
6. Delay suture if obviously infected; start proper therapy:

- a. Moist dressing
- b. Blood transfusion, antibiotics

7. Skin defects often more apparent than real.

- a. Undermine flaps
- b. Advance flaps
- c. Rotate flaps
- d. Relaxing incisions
- e. Prefer to skin grafts

B. Technical Considerations:

1. Atraumatic handling of tissues
2. Avoidance of tension
3. Obliteration of dead space
4. Counter-drain away from wound when indicated; stab wound.
5. Accurate approximation of skin with sutures remaining 12 days unless infection dictates otherwise. Suture in straight lines.
6. Clinical judgment on inspection of wound for decision to close rather than bacteriologic analysis of flora.
7. Unsuccessful closures require appropriate studies.
8. Conditions which jeopardize results:

- a. Suture of wound discharging pus or with devitalized tissue.
- b. Too early motion
- c. Unrecognized foreign bodies adjacent to wound.
- d. Inadequate hemostasis
- e. Suturing under tension
- f. Inadequate preparation of wound

9. Drainage through wound. Use stab wound.

C. Closed Plaster Treatment:

1. Not a substitute for secondary closure.
2. Indications:
 - a. To allow granulations to cover bone
 - b. Established bone infection:
 - 1) Remove devitalized tissue
 - 2) Remove bone fragments
 - 3) Avoid pocketing and pooling of pus

IV. Cranio-Cerebral Wounds: Transport to neurosurgeon quickly. (See page 85)

A. Deep infection from penetrating wounds

usually associated with incomplete removal devitalized brain and indriven bone fragments.

B. Extent of debridement guided in part by X-ray evidence of indriven bone fragments. Stereoscopic view desirable.

C. Repair dural defects:

1. Fascia
2. Pericranium, etc.

D. Close scalp

E. Note carefully neurological findings:

1. Suggests improvement or regression
2. Increasing pressure suggests deep wound infection, hematoma, residual necrotic material.
3. ReX-ray; remove fragments and close.

V. Eye Injuries: (See page 99)

A. Conservative attitude toward enucleation in forward areas; sympathetic ophthalmia usual not before 10 to 14 days.

B. Remove extensively damaged eyes only as part of debridement of wounds. Glass ball in Tenon's capsule.

C. Evisceration limited to purulent endophthalmitis.

D. Transport as litter case.

E. Send to institution equipped to care for these injuries.

F. Tarsorrhaphy certain cases during transportation:

1. Serious injury
2. Serious burns
3. Cover by skin flap if lids gone

G. Atropinize injured eye and use ophthalmic ointment.

H. Bandage both eyes.

VI. Maxillofacial Wounds: (See pages 100, 101)

A. Adequate airway.

B. Adequate debridement but with minimal sacrifice skin and other tissue.

C. Temporary reduction and fixation of fractures. Mandible and maxilla must not be wired together.

D. Isolate buccal cavity by suture of mucosa.

E. Primary closure of muscles.

F. Careful skin closure with fine nonabsorbable suture.

G. Suture mucosa and skin together if unable to close wound entering buccal cavity.

H. Drain if advisable; stab wound preferable.

I. Moist dressings.

VII. Thoracic Wounds (See pages 81, 83)

A. 1. Restore physiological equilibrium.

- a. Occlusion dressing open chest wounds.
- b. Prone position with foot of litter elevated for transportation and patient in shock.
- c. Needle aspiration air and blood without air replacement.
- d. Aspiration of airways.

- 1) Catheter
- 2) Bronchoscope

e. Underwater catheter seal as required for tension pneumothorax.

f. Oxygen, whole blood, transfusion.

2. Intercostal procaine infiltration.
3. Debridement of sucking wounds and obtaining hemostasis. Primary closure.
4. Stabilize chest with paradoxical respiration strapping/traction.

B. Endotracheal Anesthesia, When Operation Required. Oxygen, ether, positive pressure.

C. Early Thoracotomy:

1. Continuous intrapleural hemorrhage.
2. Diaphragmatic perforation.
3. Mediastinal injury with evidence visceral damage.
4. Large foreign body or debris readily accessible.
5. Wounds large bronchi or trachea.
6. Avoid excessive fluids-pulmonary edema.
7. Thoracotomy incisions postero-lateral, since anterior wounds tend to break down when defect present. Remove one rib subperiosteally for better exposure.

D. Early thoracotomy not indicated:

1. Foreign bodies and rib fragments in lung or pleura.
2. Hemothorax - aspirate dry without air replacement.
3. Lacerated or contused lung with no evidence of continuing hemorrhage.

E. Late thoracotomy, thoracic surgical service in fixed hospital:

1. Persistence clinical findings when only small amount of blood can be aspirated; clotted hemothorax.
2. Decortication, 3 to 6 weeks.
3. Empyema:
 - a. Prompt surgical drainage.
 - b. Evacuate residual clots.
 - c. Decortication before 10th week.

VIII. Abdominal Wounds:

A. Rapid resuscitation.

1. Continuation of shock despite transfusions may indicate:

- a. Internal hemorrhage
- b. Spreading peritonitis
- c. Associated complication

- 1) Atelectasis
- 2) Tension pneumothorax
- 3) Cardiac tamponade
- 4) Fat embolism
- 5) Cerebral malaria

2. Prepare to operate with rising blood pressure, 80 mm of mercury, falling pulse, improving color and slacking thirst.

B. Preoperative measures:

1. Nasogastric suction-provoke vomiting.
2. Test nerve function of extremities (commonly overlooked).
3. Rectal examination for blood.
4. X-ray-reconstruct course of missile.

C. Anesthesia:

1. Ether oxygen closed intratracheal.
2. Supplemental blocks.
3. Bronchoscopy when indicated.

D. Incision:

1. Vertical paramedian most useful, least likely to complication.
2. Secondary incisions by muscle splitting; for drainage, colostomy and exteriorization of injured colon.
3. Closure:

a. Through-and-through suture entire abdominal wall with large sutures very valuable.

b. Peritoneum and posterior rectus sheath as usual.

c. Approximate rest of wall by large caliber stay sutures:

- 1) Silk
- 2) Wire
- 3) Cotton

d. Skin unsutured.

E. Exploration of abdomen:

1. Rapid, systematic survey to determine extent of injury and tag for subsequent repair.
2. Obtain hemostasis.
3. Proceed with operation in orderly manner.

F. Stomach perforation:

1. Examine posterior surface also.
2. Repair.

G. Pancreas injury-drain lesser sac.

H. Gall bladder injuries:

1. Cholecystectomy.
2. Repair and drain by cholecystostomy.

I. Liver injuries:

1. Consider thoraco-abdominal incision.
2. Hemostatic sutures.
3. Always stab wound drain.
4. Avoid gauze packing.

J. Splenic injuries:

1. Splenectomy.
2. Repair not satisfactory.

K. Small intestine:

1. Repair or resect.
2. No exteriorization.

L. Large intestine:

1. General considerations:

a. Exteriorization for all wounds involving colon:

- 1) Through muscle splitting incision well away from laparotomy incision.
- 2) No twisting.
- 3) Mesentery falling into natural folds.
- 4) Adequate mobilization-no tension.
- 5) Double barrel with spur if injury larger than one-half diameter or resected; anti-mesenteric border sutured.

2. Defunctioning artificial anus for complete diversion fecal stream:

a. Indications:

- 1) Extensive damage lower bowel segments.
- 2) Associated injuries bladder and urethra.
- 3) Wounds extensively compounding bony pelvis.
- 4) Perforation of rectum.

b. Technical considerations:

- 1) Loop sufficiently long to allow complete transection and separation of two stomata.
- 2) No tension.
- 3) Spur undesirable.
- 4) Skin bridge preferable - two separate muscle-split incisions four inches apart.

c. Special considerations:

- 1) Sigmoid; complete diversion fecal stream:
 - a) Injury to rectum.
 - b) Injury to sigmoid where exteriorization not possible. Repair injury and divert.
 - c) Severe injury to pelvic and perineal structures.
- 2) Transverse colostomy for diversion of fecal stream:
 - a) When suprapubic cystostomy also necessary.
 - b) When missile or laparotomy wound encountered at usual site, for diversion of fecal stream.

3) Cecostomy:

- a) Never for diversion of fecal stream.
- b) Perforation cecum-look for second retroperitoneal perforation. Exteriorize.

4) Right colostomy:

- a) Extensive injuries requiring resection.
- b) Separate incision for ileostomy away from incision or wound of abdominal wall.
- c) Colostomy below costal margin.
- d) Early anastomosis between ileum and colon.
- e) Exteriorize perforations.

5) Perforation of rectum; always do digital examination in abdominal, buttocks and thigh injuries.

- a) Colostomy mandatory, defunctioning type for complete diversion of fecal stream.
- b) Free posterior drain.

1. Rectal, sacral, lateral paramedian spaces. Incise fascia propria.
2. Remove coccyx if necessary. Disarticulate and sharp dissection of exposed articulating cartilage.

M. Postoperative treatment:

1. Hold patient until equilibrium re-established; 7 to 10 days. Transports poorly early.
2. Nasogastric suction.
3. Whole blood transfusions.
4. Antibiotics, large doses.
5. Fluid balance, adequate urinary output.
6. Aspirate trachea-bronchial tree by catheter/bronchoscopy.
7. Oxygen therapy.
8. Maintain nutrition and correct vitamin depletion.
9. Seek aggressively for complications; prompt diagnosis and drainage of local abscess.
10. Close small intestinal fistulae early.
11. Formal end-to-end suture of colostomy not recommended for overseas theater unless patient can be restored to duty

IX. Peripheral Vascular Injuries: (See page 72)

- A. 1. Never ligate in continuity - divide.
2. End-to-end suture when possible; anticoagulants (not very useful in safe dosages) sympathetic blocks.
3. Excise thrombosed section.
4. Distinguish between:
 - a. Localized segmental spasm "concussion stupeur".

- 1) May improve with debridement.
- 2) Sympathetic block.
- 3) Avoidance of heat.

b. Thrombosis.

B. Threatened extremity:

1. Hold patients with threatened extremity in forward hospital until issue settled. Transportation not advised.
2. Dependent position of extremity.
3. Free use of procaine paravertebral, etc., blocks. Sympathectomy.
4. Continuous observation for impending anaerobic infection.
5. Anticoagulants. (If no other recent wound) Do not go well with sympathetic blocks.
6. Correct anemia, repeated blood transfusion.
7. If cast necessary, remove upper half.

C. Delay operation several months for development of collateral circulation, resolution of infection, and inflammation in:

1. Traumatic aneurysm.
2. Arterio-venous fistulae.

D. Early operation and repeated sympathetic blocks only for:

1. Hemorrhage.
2. Impending rupture.
3. Nerve paralysis caused by pressure.
4. Threatened gangrene.

X. Peripheral Nerve Injuries:

A. Primary suture

1. When injury small.
2. When casualties permit
3. Uncomplicated by extensive muscle damage, debris and delayed evacuation.
4. Skeletal fracture absent.
5. Soft parts closed over repair without tension.
6. When 10 days observation possible.

B. Staged mangement, more common:

1. Anatomical observation at initial debridement:
 - a. With care.
 - b. Record of findings.
 - c. Better than clinical observation.
 - d. Without painstaking dissection.
2. Cover exposed nerve ends by muscle.
 - a. Protect against fine mesh dry gauze.
 - b. Tag ends with fine stainless steel suture.
3. Immobilize joint above and below to prevent retraction.
4. Administer antibiotics parenterally.
5. Inspect wound 4 to 10 days in operating room at neurosurgical center:
 - a. Divided ends lightly approximated or clipped.
 - b. Wound closed if possible.

6. Formal suture 3 to 4 weeks in healed wounds.
7. Transfer to ZI with least possible delay.
8. No undue immobilization.
9. Partial or transient paralysis:

- a. Desirable but not imperative to visualize at primary debridement.
- b. Recovery may begin in few days.

XI. Amputations: (See page 65)

A. Circular amputation safe:

1. Lowest possible level preferable to disarticulation.
2. Explanation to patient why amputation is necessary.
3. Technical considerations:
 - a. Circular skin incision, lowest possible level compatible with viable tissue. Allow to retract.
 - b. Incise fascia level skin retracts; allow to retract.
 - c. Incise muscles level of retracted fascia; allow to retract.
 - d. Cut bone flush with muscles; no periosteal cuff.

B. Dressing stump:

1. Fine mesh gauze.
2. Avoid overlapping skin margin.
3. Skin traction at all times, including transportation.
 - a. Stockinette, Ace adherent or tape.
 - b. Light plaster cast with banjo wire including proximal joint.
 - c. Army half-ring as substitute.
 - d. Cord - elastic for traction.
4. Prevent flexion contractures.
5. Close early incisions made for infection or debridement.

XII. Joint Injuries:

A. Early complete debridement with exposure of joint.

B. Remove all foreign bodies, fragmented cartilage and bone.

C. Irrigate joint.

D. Close capsule.

E. Approximate fibers of quadriceps if patella sacrificed.

F. Unsutured skin.

G. Antibiotic installations and irrigation.

XIII. Compound Fractures:

A. First aid splinting.

B. Debridement, complete.

C. Transportation in padded cast split to skin, or splint.

D. Restorative phase:

1. Correction of anemia.
2. Antibiotic therapy.
3. Surgical elimination of residual necrotic tissue.
4. Provision residual drainage.
5. Balanced suspension traction.
6. Limited use internal fixation.

E. Evacuate major fractures to ZI.

1. Ultimate function paramount.
2. During "golden" period before 10 days.

F. Casts for transportation:

1. Always well padded - avoid peroneal palsy.
2. Split to skin - avoid circular bandage under cast.
3. Avoid windows.
4. Femur low-waisted 1 $\frac{1}{2}$ spica.
5. Humerus plaster Velpeau-never hanging cast.
6. Forearm:
 - a. In mid-position.
 - b. Flexion of elbow.
 - c. Include up to mid-brachial.
 - d. Split, bivalve, or sugar tong.

XIV. Genito-Urinary System:

A. Bladder injuries:

1. Repair perforations.
2. Suprapubic cystostomy:
 - a. Place high in fundus.
 - b. Separate well from symphysis pubis.
 - c. Drain prevesical space.

B. Renal injuries:

1. Conservative attitude by surgeon.
 - a. When damage slight.
 - b. When renal pedicle is not involved.
 - c. When doubt exists as to viability.
 - d. Drain perirenal space through flank.
 - e. Constant observation for complications requiring nephrectomy.
2. Nephrectomy:
 - a. Hopelessly damaged.
 - b. Intractable hemorrhage.
 - c. Always drain following nephrectomy, through flank.

C. Urethral injuries:

1. Splint with indwelling catheter.
2. Cystostomy when necessary.

D. Scrotum:

1. Debridement.

2. Cover exposed testicle by scrotal tissue.
3. Approximate tissue loosely.
4. Always drain scrotum.

XV. Burns:

A. Asepsis.

B. Resuscitation and prevention circulatory failure - lower nephron nephrosis.

C. Analgesia - morphine intravenously. Avoid general anesthesia.

D. Large absorptive dressings - plain, fine mesh gauze next to burn.

E. Complete debridement.

F. Liberal use of blood, proteins, vitamins, and antibiotics. Penicillin - 600,000 units daily.

G. Excise eschar-early in stages, if extensive.

H. Early grafting.

I. Early restoration of function of joint and hand.

XVI. Gas gangrene: (See pages 77, 79)

A. Diagnosis. Suspect in failure to respond to resuscitation. Distinguish between:

1. Anaerobic cellulitis:

- a. Septic decomposition of tissue.
- b. Gas and pus in fascial planes.
- c. Surface necrosis only no invasion of muscle.
- d. For treatment freely incise fascial planes. Excise devitalized tissue.

2. Clostridial myositis:

- a. Invasion and necrosis of muscle:
 - 1) Wet edematous.
 - 2) Dry emphysematous.
 - 3) Avascularity.
 - 4) Variable color.
 - 5) Non-contractile.
 - 6) Toxemia.

B. Factors predisposing:

1. Delayed or inadequate debridement.
2. Interruption arterial supply:

- a. Trauma.
- b. Thrombosis.
- c. Ligation.
- d. Vaso-spasm.
- e. Pressure within musculo-fascial envelop.
- f. Constriction by bandages or casts.

3. Persistent circulatory failure.

C. Treatment gas gangrene:

1. Restore peripheral vascular collapse.
2. Excise all affected tissue, whole muscles, or groups of muscles.
3. Amputation in hopelessly destroyed tissue.
4. Antibiotics in huge doses.
5. Antitoxin doubtful value.

XVII. Wounds of the Hand: (See page 80)

- A. Careful cleansing.
- B. Careful debridement.
- C. Salvage all possible tissue. Don't amputate tissue except when hopelessly infected.
- D. Immediate primary closure, very loosely, stainless steel, if possible to hold patient four to five days.
- E. Split thickness skin grafts.
- F. Restoration of function at earliest possible time.
- G. Splint wherever possible to permit metacarpo-phalangeal motion and in optimum functional position.

XVIII. Chemotherapy:

- A. Adjuvant when given systemically to surgical management of wounds.
 1. Not a substitute for adequate surgery;
 - a. Will not sterilize contaminated or infected war wounds.
 - b. Septic decomposition of dead tissue or contaminated blood clots will continue to occur.
 - c. Severe abdominal wound infections continue.
 2. Local use in wounds generally abandoned.
- B. Penicillin always available:
 1. Give large doses in severe infections or potential infections.
 2. Consider 600,000 units equal to one gram.
 3. Abdominal injuries with perforation of large bowel or rectum employ 10 to 15 grams daily.
- C. Streptomycin always available. Employ with penicillin in severe infections or potential infections.
- D. Aureomycin, chloramphenicol and terramycin sometimes not available. Employ in infections not responding to penicillin and streptomycin after sensitivity tests of bacterial flora of wound.
- E. Re-evaluate the patient and his wound to determine whether antibiotics can be discontinued or whether another antibiotic would be better.

XIX. The Medical Record:

A. Brief but informative.

B. Other doctors in other hospitals must know what has been done for the patient. For example:

1. Describe what occurred during open thoractomy.
2. Give location of wound of the bowel, repaired or resected.

XX. Frequent Errors in Treatment of Battle Casualties:

- A. Inadequate debridement.
- B. Packing wounds, preventing drainage.
- C. Inadequate record.
- D. Employing intercostal tube drainage for hemothorax when needle and syringe aspiration will suffice and prevent complications.
- E. Traction on bare foot and ankle in lower extremity fractures; leave shoe on.
- F. Insufficient padding under casts; peroneal palsy, ischemia pressure necrosis.
- G. Circular bandage under cast interfering with circulation.
- H. Failure to split cast to skin before transportation.
- I. Leaving windows in cast during transportation; soft tissue herniation occurs.
- J. Unrecognized nerve injuries.
- K. Failure to splint hands in position of optimum function.
- L. Failure to obtain early motion of hand and wrist.
- M. Transporting patients with eye injuries as ambulatory patients.
- N. Failure to explore the abdomen in patients with small wounds which conceivably could injure a hollow viscus.
- O. Transporting patients with abdominal injuries too early.
- P. Omitting stab wound drain in liver injury.
- Q. Repairing perforated gall bladder.
- R. Failure to drain lesser omental bursa in laceration of pancreas.
- S. Suturing laparotomy incisions tightly in perforation of the colon.
- T. Exteriorizing the colon under tension permitting retraction.

U. Placement of suprapubic catheter too low.

V. Failure to drain perirenal space in renal injuries or following nephrectomy.

W. Overlooking rectal wound by omitting digital examination, particularly in wounds of the buttocks, upper thigh, and lower abdomen.

X. Failure to divert fecal stream completely in rectal wounds.

Y. Failure to provide pararectal drainage in rectal wounds, thus inviting retroperitoneal cellulitis.

Z. Failure to suture maxillo-facial wounds.

AA. Failure to hold patient with peripheral vascular injury until everything has been accomplished at the first hospital to improve circulation or settle the issue.

BB. Failure to utilize special professional services of other hospitals as early as feasible.

CC. Morphine overdoseage:

1. Craniocerebral injury
2. Thoracic injury

3. Profound shock - poor absorption, manifest overdoseage when circulation improves with resuscitation.

TREATMENT OF GUNSHOT WOUNDS OF THE EXTREMITIES

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The treatment of wounds of the extremities can be divided into two phases in this command: the initial phase in the forward areas and the reparative phase in the Communication Zone.

INITIAL PHASE

All gunshot wounds incurred in action must be considered potentially infected and one of the primary considerations in treatment is to prevent or minimize infection. The treatment of shock and resuscitation of the wounded is discussed elsewhere and will not be considered here. In the divisional area, treatment consists of control of hemorrhage and application of first-aid dressings and the immobilization of the extremity for evacuation to the rear. The lower extremity, excepting the foot and ankle, should be immobilized in a Thomas half-ring splint. Apply traction over the shoe. Do not remove it. Use well-padded wire ladder splints for the foot and ankle. The arm can be immobilized by bandaging it to the chest with a Valpeau type dressing using triangular bandage with additional elastic bandages as necessary. Wire ladder splints are also useful for the upper extremity. The administration of antibiotics is instituted in the battalion aid station and continued through successive medical echelons until no longer indicated. A booster dose of tetanus toxoid is always given.

TREATMENT OF WOUNDS IN FORWARD HOSPITALS:

Shell fragments and hand grenades often produce ragged irregular wounds with extensive damage to bone and soft tissue. Rifle and machine gun missiles may produce small innocent-looking wounds of entrance and exit, but it must be borne in mind that these high velocity bullets often cause considerable damage at some distance from the tract of the missile. Failure to debride this latter type of wound has resulted in severe gas bacillus infection in some cases. It is therefore considered wise to debride this type of wound as well as shell fragment wounds where the presence of contamination and devitalized tissue is obvious at a glance. Antibiotics are very useful but they will not prevent the development of infection in a gunshot wound or take the place of debridement.

TECHNIQUE OF DEBRIDEMENT:

An adequate incision is necessary in order to expose the depths of the wound and facilitate the excision and removal of devitalized tissue and foreign particles introduced into the wound. Incisions should be made in the long axis of the extremity. A minimum amount of skin should be removed as it is vascular, resistant to infection, and should be preserved to facilitate delayed primary closure of the wound at a later date. The fascia should be split in the same direction as the skin. It is very important to excise all devitalized muscle as this tissue acts as a culture media for bacteria. Its presence facilitates invasive infection which will promptly involve the adjacent muscle planes. Fragments of bone with muscle and periosteal attachments should be left in place as they will later act as grafts and aid the healing of the fracture. All foreign matter such as soil and bits of clothing should be carefully removed. Metallic foreign bodies which are easily accessible should also be removed but others should not ordinarily be disturbed. All bleeding should be controlled. Debrided wounds should not be closed in the forward hospitals.

WOUND DRESSING:

Fine mesh vaseline gauze should be placed over the raw surfaces of the wound and fluffs of gauze should be lightly placed in the wound. Care should be taken not to tightly pack the wound. Circular bandages which are likely to constrict the extremity and act as a tourniquet when saturated with blood should be avoided.

JOINT WOUNDS:

When joints are involved, great care should be taken to remove foreign material without increasing the trauma to the joint. Joint capsules should always be closed if possible but the remaining soft tissue wound should be left open and treated as indicated above.

WOUNDS OF THE HAND: (See page 80)

Serious wounds of the hand present a difficult problem in the forward areas. The importance of meticulous cleansing and debridement cannot be stressed too strongly. It is desirable to close these wounds but in the presence of gross contamination and where the

loss of tissue is so great that the wound cannot be closed without tension, it is undoubtedly wiser to leave such wounds open. Partial closure with drainage is indicated in some cases. It is always desirable to provide skin coverage for exposed tendons and bone when possible. The application of a pressure dressing with splinting of the hand in the position of function is advisable for transportation. The extremity should be kept elevated to prevent oedema and swelling. The use of skeletal or pulp traction on the fingers is considered inadvisable in the forward areas. Occasionally disastrous results have been seen following its use.

IMMOBILIZATION:

Plaster of Paris casts provide the best and most satisfactory means of immobilization of extremities for transportation from the evacuation and mobile surgical hospitals to fixed hospital in the Communication Zone. Fractures involving the foot and leg require a long leg cast extending well up on the thigh. Femoral fractures should be immobilized in $1\frac{1}{2}$ spicas. Fractures involving the humerus, elbow joint, and shoulder area can be satisfactorily immobilized in a Plaster of Paris Valpeau dressing. Forearm fractures should be immobilized in an arm cast preferably with the elbow at right angles and the forearm in the neutral position as regards pronation and supination. Internal fixation of compound fractures is not indicated in the Army area and rarely in the Communication Zone.

AMPUTATIONS:

All amputations performed in the forward areas should be of the open or guillotine type. Closed amputation should never be performed in the forward areas. The purpose of the guillotine amputation is to remove an extremity where loss of circulation has resulted in gangrene or where extensive infection necessitates amputation as a life-saving measure. All amputations should be done at the lowest possible level without regard for the ultimate utility of the stump. The circular type guillotine should be done routinely; the modified guillotine or flap type amputation is occasionally indicated. An instance of this would be in the upper third of the leg where an attempt is being made to save the knee joint and as much of the tibia as possible. In the upper extremity, it is important to exercise extreme conservatism in all amputations as no prosthetic appliance has yet been devised as a substitute for the hand.

Skin traction must be applied immediately to guillotine type stumps and maintained until the stump is entirely healed. Stockinette fixed to the skin with Ace adherent has proved most satisfactory. Traction

can be maintained with a weight and pulley over the foot of the bed. For transportation, a cast can be applied to the extremity incorporating a heavy wire loop or a wire ladder splint extending beyond the stump to which elastic traction can be attached.

POSITION OF JOINTS:

Lower extremity - the hip and knee should be immobilized in from five to ten degrees of flexion. The foot should be immobilized with the ankle at right angles and the forefoot in the mid-position between varus and valgus.

Upper extremity - immobilize by binding the arm to the chest with the elbow at a right angle, the forearm in neutral position or in pronation. Place the wrist in dorsiflexion; the hand should be left free and finger motion encouraged.

BONY PROMINENCES:

All bony prominences must be well-padded. This applies particularly to the heel, the head of the fibula, the sacrum, and the anterior iliac spine.

SPLITTING OF CASTS:

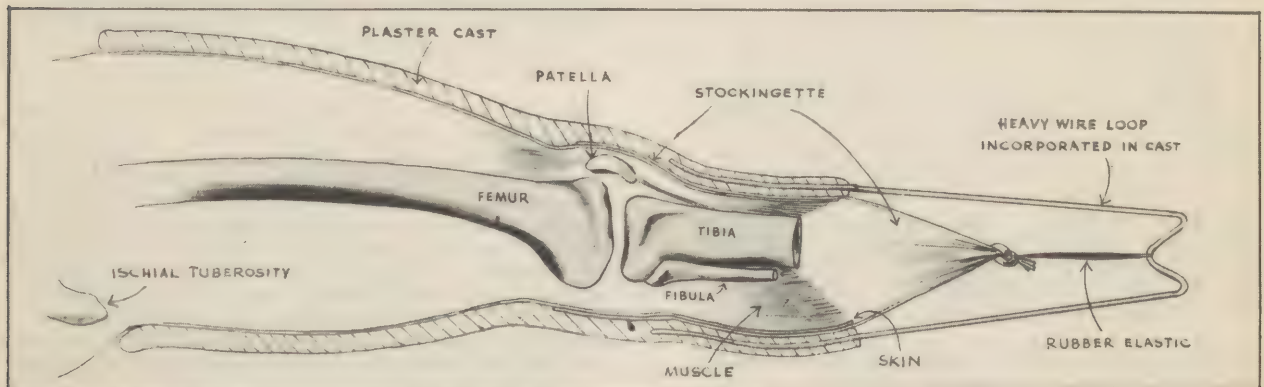
All casts should be split to include the padding in order to prevent circulatory embarrassment resulting from swelling or dependency. Circular gauze dressings should not be used beneath casts. Sheet wadding loosely wrapped will hold the dressing in place.

MARKING OF CASTS:

The outline of the fracture should be drawn on the cast with an indelible pencil. The date of the wounding and of the debridement should also be written on the cast. These data are of great value to the next medical officer treating the case.

INJURIES OF THE SPINE: (See page 91)

Compression fracture of the vertebrae in which the spinal cord is not involved, or in which there are no accompanying fractures of the laminae or pedicles, should be reduced by hyperextension, and a plaster-of-Paris jacket applied with the patient in this position. Great care must be exercised in moving these patients following injury so as not to flex the spine. Pinching of the spinal cord with permanent paralysis has been known to happen on more than one occasion by the careless movement of these patients. For fractures of the lumbar or lower thoracic vertebrae, the jacket should extend from the



symphysis pubis to the sternal notch. Cervical and upper thoracic spine fractures will require an extension of the jacket to include the head. If there are fractures of the pedicles or laminae without involvement of the spinal cord, manipulation or hyperextension must not be performed, and the spine should be immobilized in a plaster jacket in neutral position. Plaster-of-Paris jackets should not be applied in cases of paralysis caused by gunshot wounds of the spine unless the stability of the spine has been destroyed.

REPARATIVE PHASE OF SURGERY

Reparative surgery of extremity wounds is carried out in general and station hospitals of the Communication Zone. The 120-day holding policy provides ample time to treat and return to full or limited duty many patients in this command. On the other hand, those patients who will have prolonged and permanent disabilities should be returned to the ZI as soon as their condition permits.

It has been possible to transport patients with major compound fractures to general hospitals in the ZI by air within two weeks of the time they were wounded, in most instances. This policy of early evacuation of such cases is sound and has been recommended by all orthopedists in ZI hospitals. It greatly facilitates the treatment of the fracture, thus reducing the period of hospitalization as well as the degree of disability. It does not materially increase the danger of infection. The slight delay caused by early air evacuation has not materially impaired the results of wound closures. In a few instances, delayed primary closure can be done successfully in the Communication Zone without undue delay in evacuation of the patient. The selection of such cases is a question of surgical judgment.

Peripheral nerve sutures should not be carried out in this command except on rare occasion. Cases of peripheral nerve injury should be evacuated early as nerve sutures are given a high priority upon arrival of the patient in the ZI.

DELAYED PRIMARY WOUND CLOSURE*:

Successful delayed primary closure of war wounds is dependent on many factors, including the following: (1) Thorough and adequate debridement to include a removal of foreign bodies; (2) Proper preparation of the wound; (3) Closure without tension; (4) The use of fine suture material and gentle handling of tissues, and (5) Adequate drainage. It is proposed to discuss each of these factors and, in addition, special situations in wounds of the face and back.

(1) Debridement: Patients that arrive at hospitals in Japan for definitive treatment have for the most part been debrided at a previous installation. This debridement may or may not have been thorough, dependent on many factors other than poor surgical judgment. No criticism should ever be directed at a previous installation or surgeon unless one is in possession of all facts concerning the entire evacuation situation as well as the local picture. The fact remains, however, that some wounds do arrive inadequately debrided and this must be corrected prior to delayed primary closure, although both may well be done at the same sitting. Adequate debridement includes removal of all necrotic tissue; evacu-

ation of bits of clothing, dirt, gravel, etc., that may be ground into the wound, drainage of abscesses, and removal of metallic foreign bodies. One is concerned only with those metallic foreign bodies within the wound tract. Those that are distant and require removal for definite reasons must be approached through a separate incision, as an elective procedure and not concomitant with the debridement and delayed primary closure.

During World War II, several groups advocated no inspection of the wound until arrival in the operating room. We do not ascribe to that principle. It is necessary to see all wounds upon entry into hospital in order to make an intelligent evaluation as to future procedure based on the appearance of the wound.

Upon completion of the debridement, one must make a clinical decision as to the advisability of closing the wound at the time, or preparing it several days. Wounds differ so greatly, it is difficult to lay down any criteria to cover the many situations that present themselves. In very broad terms, however, the following principles apply. Debridement and closure may be attempted at one sitting under the following conditions:

- a. Minimum to moderate amount of wound drainage without frank abscesses.
- b. Presence of fairly firm red granulations (as opposed to greyish boggy granulations) or clean muscle tissue.
- c. Ability to close the wound with relatively little or no undermining. If it is necessary to undermine flaps beyond two or three cm, it is usually wise to prepare the wound prior to closure.
- d. The presence of exposed viable tendon or nerve, or uninfected bone should cause one to consider closure as early as possible.
- e. The presence of infected bone in the base of the wound should tend to delay early closure unless very adequate drainage is possible. In wounds of this type, the area adjacent to the infected bone may be closed early and the area over the infected bone at a later date.

(2) Preparation: Those wound that require preparation for closure are best treated by the wet pressure dressing method. The solution that one uses to keep the surface and dressing wet is relatively unimportant. It may be saline, boric acid, or any fluid that is sterile and non-irritating. In some instances, where the blood supply to the wound is jeopardized, a layer of penicillin or another antibiotic may be useful, but in the usual case, local antibiotics are not essential.

Two others items are considered essential in wound preparation. They are (1) pressure; (2) the application of one layer of fine mesh gauze immediately next to the wound. Pressure is necessary to keep granulations down and to prevent their becoming boggy and exuberant. The fine mesh gauze which has 44 threads to the square inch (ordinary roller bandage) when placed next to the wound prevents the granulations from growing through the dressing and being ripped off with each change. In the process of wound healing, the tiny capillaries that proliferate around the fibrin bed are extremely delicate; these will not grow through fine mesh gauze but will grow

*Prepared by Lt. Colonel David Fisher, MC, Chief, Surgical Service, 8th Station Hospital

through the ordinary 4x4 gauze dressing. A layer of wet fine mesh gauze is laid smoothly against the wound. Several layers of wet 4x4's are next applied. Waste or wet abdominal pads comprise the third layer and then firm even pressure is applied to this bulky dressing by the use of the 5-yard gauze roll which is 5 inches in width and makes an excellent container for the pressure dressing. The whole is then wrapped with roller bandage. Oil silk or parchment is contraindicated as this macerates the skin from excess fluid due to lack of evaporation.

If the wound is severely infected, Dakins tubes are inserted at the base of the dressing to allow continuous wetting of the wound. If the wound is moderately infected, solution may be added in 12 hours by pouring it into the base of the dressing without the use of Dakins tubes. In the usual wound, bacteriological studies are not ordinarily required to determine antibiotic sensitivity. Penicillin alone or the penicillin sulfadiazine combination will usually provide a sufficiently broad spectrum to obtain either bacteriocidal or bacteriostatic action. If there is any doubt as to the predominant organism, or if the wound does not do well after two or three days of wet dressing, bacteriological studies with antibiotic sensitivity tests are in order. The usual wound should be ready for delayed primary closure after two to four days of the above described procedures.

(3) Closure Without Tension: The basic surgical principle of closing any wound without tension is applicable in delayed primary closures. When suture material is used to pull tissue together so tension is present rather than simple approximation, breakdowns are almost certain to follow. Necrosis from tight tension sutures is a frequent cause of failure in closures. During the four to six day period wounds can usually be closed by trimming of skin edges without dissection of the wound base. Beyond this period, it is usually necessary to completely excise the wound down to fascia making certain that granulation tissue is completely dissected. Wide undermining of flaps will then allow the wound to close without tension. This preferred procedure is referred to in the literature as "excision en masse" or "block excision". Fascia should never be completely closed if there is any question as to underlying infection. Muscle tissue should be approximated with loose holding sutures.

Those wounds that do not lend themselves to closure without tension should be grafted rather than "take a chance". The vast majority of unsuccessful delayed primary closures are attended with sufficient skin loss due to necrosis that split grafting is necessary for subsequent closure. If sufficient skin loss exists, it is better to resort to grafting initially, thus preventing additional trauma to the patient, multiple procedures and loss of time. A goodly percentage of wounds lend themselves ideally to partial closure without tension and closure of remainder of the wound by split skin grafting.

The use of the relaxing incision is likewise a helpful procedure in relieving tension on suture lines. By means of the relaxing incision, one actually produces a double pedicle flap for closure of the original wound. Subsequently, the raw area produced by the flap shift is grafted. In dealing with flaps, one must remember that the length of the flap should rarely be more than two times the width. Long wounds require relaxing incision at a considerable distance from the wound edge in order to allow for sufficient width of the flap. Failure to observe this principle

will result in loss of parts of the flap, especially in the mid-portion where the blood supply is the poorest. It is just as necessary to drain the wound beneath the flap as in simple delayed primary closure without flap shift.

(4) Use of Fine Sutures: The type of suture material used is a definite factor in successful wound closure since wound healing may be retarded by the use of heavy suture materials with their attendant maximum foreign body reaction. One should be able to close the great majority of war wounds using No. 120 or 80 cotton as buried sutures and 3-0 black silk for the skin. In those instances where it is desirable to avoid buried sutures, .012 or .009 in. stainless steel wire should be used, not as tension sutures, but as through and through sutures. Because of their nonirritating qualities to tissue, steel sutures may remain in situ for 10 to 12 days. Gentle handling of tissue is another aid to wound healing. The use of the skin hook instead of the tooth forceps in handling the edges of a wound is a most desirable technique. This will prevent small necrotic areas in the suture line. Finally, the use of plaster splints for immobilization purposes places the part at rest and prevents stress and strain in the suture line.

(5) Drainage: All combat wounds (with the exception of face wounds) measuring over two or three cm should be drained when delayed primary closure is performed. The presence of infection in all these wounds demands a drainage pathway that will allow wound secretions to come to the outside rather than be contained within a closed area. Drainage can usually be accomplished with a piece of rubber tissue laid in the wound bed beneath the suture line and presenting at the dependent portion of the wound. (Note: A small stab wound away from the suture line frequently is useful.) The drain may be removed in 48 hours in the majority of instances, in 72 hours in the remainder. In the absence of complications, it is rarely necessary to allow the drain to remain longer than 3 days.

Wounds of the face require special considerations since the original debridement and closure is important not only for cosmetic purposes, but to future success in reconstructive procedures. The blood supply of the face is extremely abundant so that tissue loss due to interference with vascular channels is not nearly as extensive as in other parts of the body. Therefore, debridement of necrotic tissue should be exceedingly conservative. Excise only tissue which is definitely necrotic. If in doubt, do not excise. Buried sutures of 120 cotton should be used to approximate muscle and the subcutaneous layer. For skin closure, 6-0 ophthalmic silk may be used. A large pressure dressing is then applied to reduce to a minimum, postoperative edema and the oozing of blood. Face wounds frequently may be closed without drainage, but if in doubt, drain. With adequate buried layer of sutures, removal of the skin sutures should be started in 48 hours and completed in 96 hours. The wound is supported by a strip of fine mesh gauze saturated with collodion and the pressure dressing continued only if indicated.

Wounds of the back frequently break down because of the failure of immobilization. The back muscles are used in many motions of the body and it usually is necessary to include underlying muscle in the suture in order to remove the tension from the suture line. The use of stainless steel wire from skin through muscle to skin on the opposite side is

a very useful procedure. The postoperative pressure dressing likewise assists in immobilization. (Note: Splints and plaster casts used judiciously are of great value.)

In summary, the following principles should be followed in the delayed primary closures of war wounds:

1. Thorough debridement prior to closure is essential.
2. Closure within the 4 to 6 day period is ideal, but the appearance of the wound rather than the length of time is the governing factor.
3. Wounds that require preparation for surgery should be treated by the wet pressure dressing method.
4. The principle of closing without tension is of paramount importance. This may be accomplished by any one of several methods, but excision en masse is preferred.
5. Adequate drainage of most wounds is essential.
6. Gentle handling of tissues and the use of fine suture material are definite aids in wound healing.
7. Wounds of the face and back require special consideration.

WOUNDS OF THE HAND: (See page 80)

The loss of use of the hand causes great disability. The aim of all treatment should be to maintain and restore function. Surgery of the hand is highly specialized and results depend upon the experience and skill of the surgeon. For this reason, such cases should be evacuated to a hand center in the ZI as early as possible. The following important steps in treatment are indicated in the Communication Zone:

1. Early mobility of the hand. The metacarpal-phalangeal and the interphalangeal joints must be kept moving. This requires careful and constant supervision by the doctor and physiotherapist.
2. Prevent edema and swelling by elevation of the extremity.
3. When immobilization is necessary, place the hand in position of function - moderate flexion of the fingers and thumb with the thumb in position of opposition and the wrist in moderate dorsiflexion. Remember that function will be permanently lost by prolonged immobilization. Do not pay too much attention to the x-ray. If function is good, bony deformity is of little consequence.
4. Skin grafting. All open wounds should be skin grafted early to reduce scarring and the inevitable spread of infection.
5. Transfer to a hand center as early as possible.

PREPARATION OF PATIENTS FOR EVACUATION TO THE ZI:

Most patients will arrive in a fixed hospital in the ZI within four or five days after leaving Japan. Immobilization of extremities in well-padded and properly fitting casts as indicated above provide the most satisfactory means of fixation of fractures. The necessity of splitting casts down to the skin and the avoidance of using circular bandages is of extreme importance and repetition of this point is made for emphasis.

ERRORS TO BE AVOIDED IN THE TREATMENT OF BATTLE CASUALTIES INVOLVING THE EXTREMITIES:

1. Inadequate debridement.
2. Packing wounds with vaseline gauze.
3. Use of internal fixation in compound fractures.
4. Applying traction to the bare foot and ankle - do not remove the shoe.
5. Insufficient padding over the head of the fibula with resulting peroneal paralysis. Insufficient padding over the heel and sacrum.
6. Using circular bandage under cast interfering with circulation.
7. Failure to split casts to skin before transportation.
8. Leaving windows in casts with soft tissue herniation during transportation.
9. Failure to recognize peripheral nerve injuries.
10. Failure to maintain early motion of hand.
11. Failure to splint hand in position of function.
12. Keeping of inadequate records.

POLICY REGARDING ELECTIVE SURGERY AND MANAGEMENT OF FRACTURES:

1. Elective arthrotomy for internal derangement of the knee joint should not be done in this command.
2. It is considered unwise to perform elective surgery for nonservice-connected disabilities.
3. Open reduction of simple fractures should not be undertaken except in a hospital provided with a well-trained orthopedic staff and adequate facilities for this type of surgery.

COMMON PROBLEMS IN MILITARY SURGERY

Colonel Frank E. Hagman, MC, Surgical Consultant, GHQ, FEC

A Surgical Research Team recently visited the FEC to ascertain the problems in the surgical care of battle casualties. Dr. Fiorindo Simeone, Professor of Surgery, Western Reserve University, Major Curtis Arts, member of the Surgical Research Unit, Brooke Army Medical Center, Captain George Schreiner, Internist, and Lt. Russell Nelson, Surgeon, comprised the team.

At each U. S. Army Hospital and at several divisional medical units in Korea, an informal discussion was held with the medical officers resulting in a mutual exchange of ideas and experiences relating to professional care of the wounded. It is fitting to record herewith a condensation of some of these pertinent discussions.

Debridement: Battle wounds should be debrided by employing bold incisions through the skin and fascia to furnish free exposure of the pathway of the missile. This should be accomplished with due regard for vital structures. All devitalized tissue and foreign material must be removed to prevent and eradicate infection.

Debridement of large wounds is necessary as an integral part of the measures used in the resuscitation of the patient. It is wise to debride large wounds when the condition of the patient has been improved by other resuscitative measures so that blood pressure is above 80 and rising, pulse rate is decreasing, color is improving, temperature of the skin is rising, and thirst is slackening. Debridement is then undertaken while the other resuscitative measures are continued during the administration of anesthesia and the performance of the operation.

The types of cases that do badly with infection are those with wounds of the rectum, retroperitoneal structures, ascending colon, other parts of the large bowel, severely injured extremities, and wounds of the buttocks.

Wounds of the neck should be debrided and foreign material and devitalized tissue removed when the risk of injuring vital structures during the operation is not great. Tracheal injuries must always be debrided. Excision of a cartilage may be necessary to close a defect. A tracheotomy should be performed in this type of wound. Esophageal injury requires debridement, repair and drainage.

The rationale of leaving debrided wounds open for secondary closure subsequently is the frequent inability of the operator to be certain that all devitalized tissue has been removed. Necrotic tissue in the wound, several days following a careful debridement, is frequently seen. Serious infection would be expected by closing primarily such a wound.

Gas Gangrene: Two varieties of anaerobic infection are distinguished in which clostridial organisms are of etiologic importance: (See pages 77, 79)

1. **Anaerobic cellulitis.** In this, septic decomposition of tissue occurs with the formation of gas and pus in the fascial planes with surface necrosis of tissue and without invasion of muscle. Free incision of fascial planes and excision of devitalized tissue will control the infection when employed with other therapy for infection.

2. **Clostridial myositis** is much more serious, frequently fatal. Invasion and necrosis of muscle occurs, associated with profound toxemia. Studies during World War II indicated that 40% of clostridial myositis occurred in patients with arterial injuries and 66% in patients with severe compound fractures.

Early diagnosis and treatment are of paramount importance. The diagnosis should be suspected in failure to respond to the usual resuscitation measures. It should be suspected in patients whose clinical condition appears serious.

Amputation above the involved area is necessary in patients with serious infection or hopelessly damaged tissue. Excision of all affected tissue, whole muscles or groups of muscles, must be accomplished in the less serious or when such muscles as the pectoral, latissimus dorsi, or gluteal muscles are affected.

Large doses of antibiotics are of value as an adjunct to operation. Antitoxin is of doubtful value.

Gas gangrene is not a rare disease in the Far East Command. Severe infection by clostridial organisms can kill in five hours.

Shock: The concept of irreversible shock arose following research during World War I by investigators such as Cannon, Bayliss, and others. It was observed that if shock persisted for longer than two hours, it was difficult to resuscitate patients, i.e., they became "irreversible".

To teach the doctrine of irreversibility in shock is dangerous, unwarranted and impractical. It is dangerous because the profession may throw away its tools and go home to bed when faced with the problem of so-called irreversible shock. It is unwarranted because even "death" appears to be reversible as witness restoration of the function of the heart in cardiac arrest by direct massage. It is impractical because the causes for the production of seeming irreversibility are not investigated and measures to remove or mitigate the cause are not instituted by adhering to such a doctrine.

Profound shock which seems to be irreversible has been shown in practice to be associated with complications, some of which can be eliminated or at least treated, thus favorably modifying the state of shock. These complications are:

1. **Atelectasis.** Favorable response has resulted when such a diagnosis is made by removing the obstruction bronchoscopically.

2. **Tension pneumothorax.** Decompression by employing a hollow needle may produce dramatic results.

3. **Cerebral malaria.** The shock state may be accompanied by this condition, for which specific therapy may be instituted.

4. **Concealed hemorrhage.** The recognition and treatment of concealed hemorrhage in the chest, abdomen or thigh may be important in the shock state, not responding to the usual measures.

5. Cardiac tamponade. The recognition and treatment of this may turn the tide.

6. Severe infection. Severe peritoneal contamination, clostridial infection, and large wound infection may contribute to the shock syndrome. Paracolon bacilli and toxins may produce a syndrome like shock when injected intravenously in dogs. Bleeding dogs to exsanguination and restoring the blood volume subsequently by the blood removed does not bring the dog back to normal unless the dog is protected against infection by antibiotic drugs. Contaminated blood transfusions may produce the syndrome of shock.

7. Fat embolism. This may contribute to the state of shock. Fat embolism occurs in fractures and in large soft tissue wounds. The fat globules are deposited in the lung. Later they sometimes pass through to the brain and kidneys. Examination of the retina may reveal yellow particles surrounded by a red halo and the urine may contain fat droplets.

The common denominator in hemorrhagic shock is blood loss. Profound shock in healthy young males who have sustained wounds, for practical purposes, is considered to be accompanied by the loss of 3000 to 3500 cc of blood, modified by trauma of transportation and unsplinted fractures, administration of morphine, pain of perforation of intestines, and apprehension of the patient. More blood volume is lost from severe wounds of the extremity than from abdominal and chest injuries as a rule. In four groups of patients with blood loss, the Evans dye blood volume determination has shown that clinical signs are absent in patients with blood volume reduced one liter or less, that clinical signs of severe shock including systolic blood pressure of 20 to 40 mm of mercury occur with blood volume reduction of 50%, and that mild to moderate clinical signs occur in groups with more than one liter and less than 50% loss of blood volume.

Contrary to the usual teaching, hemoconcentration is not seen in shock if blood for hematocrit determination is taken from a vein rather than from the ear or finger, except in shock accompanying burns and the crush syndrome. Although coma may occur in very severe shock, usually other causes such as head injury are present when the patient in shock is confused or comatose.

Resuscitation in Shock: As a rule of thumb, the healthy adult male who is in profound shock from wounding can be considered as having lost 3000 to 3500 cc of his blood volume. Restoration of blood volume to normal is not necessary before operation is undertaken. The aim is to obtain rising blood pressure, with 80 mm of mercury systolic as critical level, because urinary filtration pressure is adequate for the excretion of urine; slowing pulse rate; improving color and peripheral temperature indicating return of capillary circulation; and slackening of the sensation of thirst. Three hours should not be exceeded in these resuscitation measures. The possibility of complications contributing to the prolongation of shock as discussed above should be investigated and proper therapy instituted to correct them. Debridement of wounds, closure of perforations of the intestines, control of hemorrhage, institution of antibiotic therapy must be considered as essential elements in the continuing plan of resuscitation. During the administration of anaesthesia and the performance of the operation, the other measures for resuscitation are continued.

The shocked patient who does not respond to therapy and whose veins are distended, indicating that the venous system is filled or plethoric, can be given intra-arterial blood. The intra-arterial transfusion by-passes the lesser circulation and provides blood to the coronary arteries. A calculated risk is undertaken since arterial spasm may occur following the transfusion, resulting in ischemia. If the intra-arterial transfusion is given with a manometer in the system preventing pressures of more than 120 mm of mercury, the arterial tree will not be overloaded. Three hundred to 400 cc frequently will be sufficient although much more may be necessary if this method is destined to be successful. The cannula, however, should be kept in the artery should further intra-arterial transfusion be indicated.

Vasoconstrictor drugs have little place in the treatment of shock. Additional renal insult may result from vasoconstriction of the arterioles supplying the tubules of the kidney already anoxic from the shocked state.

ACTH and Cortisone in Shock: Little is known about the effects of these hormones in traumatic shock. From the information known of the action of these hormones, little value could be expected from ACTH. In shock it is logical to assume that the body in its reaction to stress provides sufficient ACTH to stimulate the adrenal to maximum activity and no additional secretion of corticosteroids could be expected by parenteral injection. There may be a better argument for administering cortisone since more cortisone may be required for peripheral utilization than is produced by the adrenal.

If these drugs are to be evaluated in the treatment of shock, careful data must be gathered and adequate controls must be established. Otherwise, the promiscuous administration of them will yield no information of value.

ACTH and cortisone must be used by doctors fully cognizant of the profound physiological effects of these hormones. They produce sodium and water retention and potassium excretion. They interfere with the body's normal inflammatory defense to infection. Adrenal suppression occurs with prolonged use of cortisone as does the thyroid with prolonged use of thyroxin.

Lower Nephron Nephrosis: Autopsy material at the 406th Medical General Laboratory on cases dying of battle wounds indicates that lower nephron nephrosis is a frequent cause of, or contributing factor to, death. Many deaths associated with anuria or oliguria have occurred in forward hospitals. Only a small percentage of these have been subjected to necropsy. The problem is of considerable significance.

The role of prolonged shock in the etiology of anoxia and subsequent adverse cellular changes in the lower nephron is well known and is the common denominator. The role of blood transfusion reactions and breakdown products of the blood, as possible cause of lower nephron nephrosis, is not settled.

Lower nephron nephrosis usually manifests itself in 48 hours after injury. The water tolerance test is useful in differentiating oliguria of dehydration from that of lower nephron nephrosis. It is performed by placing a catheter into the bladder and 750 to 1000 cc of 5% glucose intravenously is administered

rapidly. If oliguria is caused by lower nephron nephrosis, the urinary output will not be increased, whereas if dehydration is present, a definite increase in the urinary output will occur, provided the systolic blood pressure is above the filtration pressure of 80 mm of mercury.

There is little evidence to support the idea that the urine should be alkalized in lower nephron nephrosis. Numerous critical experiments have failed to improve the condition of the patient and to alkalize the urine. In fact, it is probable the demise of patients with this condition has been hastened by the administration of alkalis.

More is known about what not to do than what to do for the patient with lower nephron nephrosis. What not to do is overload the patient with fluids. The aim should be to administer 500 cc of fluid per day, plus that which is lost by sensible means.

Vascular Injuries: The problems in arterial injuries are to preserve life, preserve limb, and prevent circulatory insufficiency in later years of life. In time of battle, large flow of casualties requiring surgical care frequently precludes the possibility of expending the time and attention on one case of arterial injury required to perform a carefully conducted repair or graft. Frequently, the wounds are of such severity as to preclude attempts at repair because of loss of substance, the danger of infection, and secondary hemorrhage. There are cases, however, when carefully picked and under relatively ideal circumstances, that are worth the time and effort to repair or span by inserting grafts.

Injuries of veins are not a problem because repair or ligation can be accomplished without difficulty.

In popliteal injuries a false sense of security is engendered because the skin appears to improve in color and temperature. The deep muscles, however, are necrotic. The worst lesion to contend with is thrombosis because propagation extends distally to tributaries.

Attempts should be made in suitable cases to repair arteries. The most successful results occur in partial lesions which can be repaired by suture transversely. Complete division is the next most successful type of lesion to repair if it can be accomplished without tension. The artery should not be mobilized beyond the major collateral proximally and distally to effect the anastomosis. The third type of lesion is that with loss of substance requiring a vein graft. This can be accomplished by employing a graft from such a vein as the great saphenous sutured into place in the reverse direction of its normal position. The disadvantage is the necessity of two lines of suture for anastomosis and the attendant risk of hemorrhage.

Heparin is not necessary if a good flow of blood occurs across the suture line. The amount of heparin required to prevent clotting given parenterally is dangerous. However, with the risk of thrombosis distally in some cases, it may be employed.

Insertion of a polyethylene tube proximal to the anastomosis with continuous heparinization as practiced by Freeman appears to be worthwhile.

Sympathectomy to improve the collateral circulation is definitely worthwhile if the patient's condition

is such as to tolerate the added time required for the operation. Sympathetic blocks are of value, but will not produce as much vasodilatation as sympathectomy and the effect is less with each repeated sympathetic block.

Parenteral fluids: Protolysates, serum albumin and blood are not sufficient to insure a positive nitrogen balance during parenteral administration of fluids. This may be done by giving 3000 cc of 25% glucose intravenously per day, because of the protein sparing action of the glucose. The solution is given slowly and requires careful observation by the nursing staff to guard against the possibility of accidental extra-vascular infusion of the hypertonic solution.

One should be concerned about potassium loss in patients treated with naso-gastric suction for a period in excess of 24 to 48 hours. Lassitude and fatigue may occur from hypokalemia. Replacement therapy can be instituted with safety if the urinary output is in excess of 500 cc per 24 hours. Four to eight grams of potassium chloride should be given each day during such periods when naso-gastric suction is used, parenteral fluids are given, and urinary output is adequate.

Battle casualties are dehydrated more frequently than is realized by the medical profession. The extent of dehydration will be greater in summer and may be of real importance. Administering whole blood to dehydrated patients will not correct this. It is essential to treat the patient for dehydration *pari-passu* with other resuscitation measures.

Serum albumin, as an emergency measure in shock, should always be combined with isotonic fluids in the ratio of one to five, to prevent depletion of the extra-vascular fluid compartments.

Tetanus: Tracheotomy reduces the mortality rate of tetanus. It should be performed early in the course of the disease and not as an emergency operation in extremis. Nursing care, fluid and electrolyte balance, naso-gastric feeding and adequate sedation improve the chance of survival.

At least two million units of penicillin should be given daily to control the propagation of the organism and secondary complications. Tetanus antitoxin may be given in doses of 100,000 units intravenously when the diagnosis is made, and additional 100,000 units in one hour intravenously, and a third 100,000 units infiltrated about the wound. This will neutralize the circulating toxins but will have no effect upon the toxin fixed in nerve tissue. Excision of the wound may not be necessary. Intrathecal administration of tetanus antitoxin may have value in selected cases.

Anaesthesia: Anaesthetic deaths have occurred in a very small number of battle casualties. It is possible that three of 160 deaths studied by the 406th Medical General Laboratory were caused by anaesthesia.

In careful studies of mortality from anaesthetics in five large centers in the United States, the mortality rate was ten times greater in the group of patients given curare.

Narcotics: Morphine should be avoided in cranio-cerebral injuries and used judiciously in thoracic injuries and traumatic shock. The patient in shock does not absorb morphine from tissues normally, consequently too large a dose or more than one dose may be injected because pain is not relieved. When the

peripheral circulation is improved and morphine is absorbed, dangerous overdosage becomes manifest. For the patient in shock who actually requires morphine, it is safer and more efficacious to give it intravenously in a dose no greater than 10 to 15 mgms (1/6 grain to 1/4 grain).

NOTES ON THE TREATMENT OF WOUNDS OF THE ARTERIES

Dr. Fiordio Simeone, Professor of Surgery, Western Reserve University

1. INTRODUCTION:

Wounds of important arteries occur in about 1% of battle casualties, the most common being the long arteries of the extremities (axillary, brachial, femoral, and popliteal). In a theater of operations, the surgeon is concerned primarily with acute lesions of the arteries where the possibility of interruption of a main artery to a limb exists.

The interruption of the continuity of the artery following the development of an arterial aneurysm or an arteriovenous fistula almost never leads to gangrene. The incidence of amputation for gangrene among war wounds causing acute interruption of an artery, however, is very high. Table I indicates, in round numbers, the expected incidence of gangrene after the interruption of major arteries acutely.

TABLE I

EXPECTED INCIDENCE OF GANGRENE AFTER ACUTE INTERRUPTION OF MAJOR ARTERIES

<u>Artery</u>	<u>Incidence of Gangrene</u>	<u>Usual Level of Amputation</u>
Axillary	30%	Fingers
Brachial, above profunda	40%	Fingers, occasionally forearm
Brachial, below profunda	15%	Fingers, occasionally forearm
Brachial, total	20%	Fingers, occasionally forearm
Femoral, common	60%	Leg, below knee
Femoral, superficial	45%	Toes, transmetatarsal
Popliteal	80%	Leg, above knee

2. TYPES OF LESIONS:

Various types of lesions are encountered in war wounds of the arteries: spasm, contusion, thrombosis (usually following spasm and contusion or infection), laceration, severance and avulsion.

Of all lesions, thrombosis has the worst prognosis. It is better to resect a segment of an artery which is thrombosed or which is so contused that thrombosis is very likely, than to depend upon the usual methods for administering anticoagulants to prevent thrombosis. For this reason, exploration of an artery where spasm and contusion are suspected is indicated. Contused segments are best excised.

3. MANAGEMENT OF WOUNDED ARTERIES IN THE FIELD:

a. Repair and ligature: The best results are obtained when the continuity of a major artery can be restored by suture. The easiest are those where only a part of the circumference is lacerated. Enough of the artery should be mobilized so that suture may be done transversely in order to avoid constriction. When end-to-end suture is contemplated, it is imperative that enough artery be freed up. Such sutures under tension will not be successful. When it is impossible to accomplish suture without tension, it is better to graft a segment of vein to bridge the gap. When vein segments are used, their direction must be reversed to avoid possible obstruction to the flow of blood by the valves.

It must be emphasized that, in the field, the above procedures can be done only under ideal circumstances. They are possible when the wound is small, with relatively little sacrifice of soft tissue and where compound fracture is absent or not severe. When the wound is complicated by extensive loss of tissue and/or by severe compound fracture, it is both futile and risky to attempt anything but simple suture where only part of the vessel's circumference is lacerated or ligation of the artery where it is completely transected with loss of substance. Restoration of continuity of these vessels may be possible later, at the time of reparative or reconstructive surgery.

As a general principle, in cases which have wounds of the arteries, every effort must be made to be meticulous with surgical excision of devitalized tissue and to preserve collateral blood vessels. Metal, glass and plastic tubing prostheses have been unsuccessful to date. The non-suture technique described by Blakemore, et al, may have been useful in a very few cases but is of doubtful value in the field.

b. Ligation of the concomitant veins: Largely through the writings of Sir George Makins, it was recommended during and after World War I that the concomitant vein should be ligated whenever a major artery is interrupted. Observations since that time suggest that the procedure is certainly not beneficial and may be harmful. It is occasionally indicated not to improve the remaining circulation, but

to avoid pulmonary embolism in certain selected cases.

c. Anticoagulants: Anticoagulants are risky to use in the field where one is dealing with multiple wounds and when facilities are inadequate for the laboratory control of anticoagulants. Indeed, it is unlikely that the possible advantages of anticoagulants outweigh the risks and dangers of their use in the field.

d. Vasodilators: Vasodilators which have a generalized effect are of little value in patients with occlusion of a major artery and in whom the rest of the vascular tree is essentially normal. In such cases, the vasodilator produces vasodilatation throughout the body except where organic occlusion exists and may thereby rob the partially ischemic area of blood which might otherwise have gotten to it. To be effective, vasodilators should be injected into the arterial supply of the extremity involved so that they may act locally and not generally. One has to weigh the advantages of local vasodilatation against the disadvantage of repeated arterial punctures. The procedure is seldom worthwhile.

e. Sympathetic block and sympathectomy: Since, when a major artery is interrupted, the circulation to the limb is provided through collateral arteries, it is reasonable to release these arteries from vasoconstrictor activity. Data from World War II, in fact, demonstrated a reduced incidence of amputation among such casualties for whom sympathetic procaine block was done. In the case of sympathectomy, however, the data did not demonstrate a lowered incidence of amputation among cases for which sympathectomy was done. Indeed, the incidence of amputation among such cases was higher. However, it must be recalled that sympathectomy was not done as a routine. Instead, it was done almost always when the fate of a limb had already been sealed, hence the high incidence of amputation among those cases.

Whenever possible, if there is clinical evidence of compromise of the circulation, sympathetic block should be done and in the case of serious arteries (femoral, popliteal), sympathectomy should be seriously considered. Unless the collateral circulation is obviously adequate, ganglionectomy should be done as early as possible if it can be done without adding undue risk to the initial operation. If it appears unwise to subject the patient to further surgery at the time of initial operation, and the circulation is still questionable, ganglionectomy should be done as an elective procedure as soon as reasonable.

f. General measures: Most patients with wounds of the arteries have lost considerable blood which is often replaced inadequately. Careful attention should be paid to the hemoglobin or hematocrit concentration so that any anemia may be corrected promptly.

Circular bandages are to be avoided in extremities in which the circulation is impaired. Plaster casts, at least the initial ones, must be bivalved, not split only. The position of the patient in bed is of some importance. The head of pressure in the collateral vessels is improved in proportion to the degree to which the limb is kept below the level of the heart. The patients must be watched carefully so as to cause no delay in the recognition of the establishment of serious infection. Amputation, where gangrene is threatened, may be delayed to await improvement in the collateral circulation, but it is not advisable to prolong the waiting period if the patient shows systemic effects from the involved limb.

4. ANEURYSMS:

Arteriovenous aneurysms or fistula are not a problem for an overseas theater. Exceptional cases show important ischemia in the periphery or serious cardiovascular effects peculiar to this type of case and need treatment overseas. The vast majority, however, can and should be transported to the ZI. Often, however, in the case of arterial aneurysms, emergency treatment is necessary. Unlike arteriovenous fistula, these may increase in size and when close to the surface or connected to the surface by only a short direct tract, may bleed secondarily. The indications for the emergency treatment of arterial aneurysms are as follows:

- a. Progressive increase in size of the mass.
- b. Pressure upon adjacent structures causing:
 - (1) Pain
 - (2) Nerve paralysis
 - (3) Serious interference with venous drainage
- c. Secondary hemorrhage

SUMMARY:

1. Acute interruption of major arteries is attended by a high incidence of gangrene. Attempts to repair arteries and restore their continuity are therefore indicated in selected cases.
2. Concomitant vein ligation is not advisable.
3. The use of anticoagulants in the field is not advisable except in selected instances because of the risk involved and the questionable value of the procedure.
4. Sympathetic procaine block should be done when the circulation to an extremity is interrupted. Sympathectomy should be of value in selected cases.
5. Arteriovenous aneurysms should be treated definitively in the ZI. Arterial aneurysms may be treated in the theater of operations for certain actual or impending complications.

SECONDARY HEMORRHAGE IN WAR WOUNDS

Colonel Joseph P. Russell, MC, Chief, Surgical Service, Tokyo Army Hospital

GENERAL CONSIDERATIONS: In the care of war casualties the surgeon will be called upon to treat severe secondary hemorrhage, a demand for which he is usually poorly prepared by previous experience. Secondary hemorrhage in war wounds is almost always due to an underlying vascular injury and is rarely

due to slough of an uninjured major vessel. Serious secondary hemorrhage is usually arterial, although occasionally venous bleeding may be severe. Slight hemorrhage from oozing granulation tissue will not be considered in this discussion.

The onset of secondary hemorrhage is frequently unheralded until sudden, furious and tempestuous hemorrhage exsanguinates the patient and he is found in a pool of blood. These patients may bleed to death quickly unless the hemorrhage is promptly controlled.

Many patients sustaining gunshot wounds, with major vascular injuries, will die of hemorrhage immediately. Those receiving smaller injuries, or injuries to smaller vessels, may survive. In the event of survival, there may be a varying amount of bleeding at the time of injury, the history of which may be of value to the surgeon later in evaluating the case. Vascular wounds are frequently associated with other major injuries. Due to the proximity of nerves in the neuro-vascular bundle, associated nerve injuries are common. Fractures, likewise, are frequently present.

Various types of vascular injuries are produced by war missiles and the resulting pathology will depend to a large extent on the nature of the vascular damage.

When the ARTERY alone is injured there will be immediate hemorrhage, varying in amount, followed by the formation of a clot in the soft tissues and about the injured vessel. The bleeding ceases and the clot begins to organize. The center of the hematoma communicates with the hole in the artery, and as the clot liquefies the flow of blood through the liquefied center hollows it out producing an aneurysmal sac. The wall of the sac is formed by the organized hematoma. This results in what is termed a "pulsating hematoma", a "false aneurysm" or "traumatic aneurysm". The characteristic finding in this type of vascular injury is a pulsating mass, which may later develop expansile pulsation, and over which is heard a systolic intermittent bruit. This type of aneurysm is very prone to enlarge and rupture, particularly in infected wounds.

If the VEIN alone is injured, immediate hemorrhage will likely be present and followed by a collection of blood in the tissues which shows neither pulsation nor bruit.

If both the ARTERY AND VEIN are damaged, either an arterio-venous fistula or an arterio-venous aneurysm develops depending upon the extent, size and location of the holes in the vessel walls.

When a missile passes between an artery and vein producing a small rent in both vessels, a fistula may develop with little or no escape of blood into the surrounding tissues. If the holes are larger, a hematoma forms about the injured vessels, organizes and produces an arterio-venous aneurysm, part of the arterial blood being shunted through the aneurysmal sac into the vein. With the vein acting as a "pop off" valve to reduce the pressure in the sac, these lesions are not so prone to enlarge and rupture as are the pure arterial aneurysms. However, if the venous outlet from the sac is small, or for some other reason does not adequately relieve the pressure in the sac, these aneurysms will also enlarge and rupture. The characteristic findings in an arterio-venous fistula and aneurysm are a "purring" type thrill and a continuous bruit, which is more marked during systole than diastole. The bruit is transmitted along the course of the vessels. The finding of a systolic bruit does not of necessity indicate that there is arterial injury only, since damage to the veins may be found at operation.

An arterio-venous aneurysm, in addition, will usually show swelling and expansile pulsation. When possible, operation on patients with arterio-venous fistulas or aneurysms should be delayed several weeks to months to allow collaterals to develop. Large arterio-venous aneurysms near the heart may produce early cardiac failure. The walls of any of the above vascular injuries may heal sufficiently strong to prevent hemorrhage, or they may weaken and rupture.

When wounded men are originally examined at forward hospitals there may be no signs to indicate that there is an underlying vascular injury. Several days to a month may pass before signs of vascular damage become evident; however, most patients will have developed positive signs within 4 to 7 days.

TIME OF HEMORRHAGE: Secondary hemorrhage from war wounds usually occurs between the 8th to the 18th day after injury. It is more frequent in infected than in clean wounds. The hemorrhage may be external and the patient found in a pool of blood, or concealed with bleeding into the tissues. Hemorrhage during this period is thought to be due to a combination of thinning and weakening of the sac from the sustained pressure within, and to proteolytic action on the sac of ferments produced by invading bacteria. At any rate, whatever the cause, the physician should be on the lookout for hemorrhage during this critical period.

Of the 59 secondary hemorrhages developing at Tokyo Army Hospital, the average elapsed time between injury and hemorrhage was 15.6 days. The shortest interval was 5 days and the longest period was 44 days. However, in this series, 37 hemorrhages or 63% occurred between the 8th and 17th days. Forty-eight hemorrhages (83%) occurred as follows: second week, 26; third week, 15; fourth week, 7.

SIGNS OF IMPENDING RUPTURE AND HEMORRHAGE: A sudden increase in the size of the pulsating mass is indicative that the sac has leaked and allowed additional blood to escape into the soft tissues. Pain invariably accompanies the increased swelling and is due to pressure. Increased swelling in the extremity distally may develop, due to interference with return circulation. Continued or intermittent oozing of dark or dark and fresh blood from a wound is almost a sure sign of underlying vascular injury and impending hemorrhage. The wound is waving the "red flag" to warn of imminent danger. Patients with the above signs are not safe for evacuation.

INDICATIONS FOR OPERATION:

1. Hemorrhage, internal or external.
2. Sudden increase in swelling and size of the lesion.
3. Sudden increase in pain at site of the lesion.
4. Increased swelling of the extremity distally, due to impaired circulation.
5. Imminent rupture of the pulsating sac.

TREATMENT: Treatment begins by ascertaining which patients have dangerous vascular injuries that are likely to rupture and bleed. Knowing that such wounds are apt to hemorrhage, a tourniquet should be kept on the patient's bed for emergency use. In spite of all precautions, a certain number of

hemorrhages will come as complete and unqualified surprises.

Early ligation of a major artery is frequently followed by some degree of gangrene distally. Ligation should be postponed as long as practical to allow development of collateral circulation. However, if hemorrhage has occurred or appears imminent, operation should be performed without delay. A severe gushing hemorrhage, which has stopped spontaneously, will almost surely recur later when the blood pressure rises. Packing of Gelfoam and similar materials blindly into a bleeding wound may temporarily control the hemorrhage, but if due to a ruptured aneurysmal sac, the bleeding will almost certainly recur. The bleeding vessel must be found, inspected and controlled. Treatment must aim at completely controlling the hemorrhage, and preserving an adequate blood supply distal to the injury. The damaged vessels must be repaired or ligated. A major arterial trunk should be repaired if at all possible, whereas smaller vessels can be ligated without hesitation. Ligation of the companion vein when an artery has been ligated is accepted practice. Recent experimental work indicates that ligation of the companion vein neither improves nor hinders the nutrition of the limb.

CONTROL OF HEMORRHAGE DURING OPERATION: An adequate supply of blood for transfusion during operation should be obtained. The main arterial and venous trunks must be controlled proximal to the site of the hemorrhage. In the extremities, a pneumatic tourniquet will control the bleeding and allow an orderly approach. In wounds so located that a tourniquet cannot be used, such as in the groin, upper thigh, the root of the neck and axillary region, the main artery and vein should be exposed proximal to the lesion and controlled by encircling tapes before any attempt is made to expose the vascular injury itself. Exposure of the main vessels distal to the lesion also aids in providing a dry field. Even at best, with the main vessels occluded proximal and distal to the vascular injury, there will still be an appreciable flow of blood into the operative wound. The soft tissues about the lesion will be found suffused with blood, thickened, friable, edematous, and landmarks often obliterated or obscured. The sac is usually very friable, with the consistency of wet blotting paper. When the sac is disturbed it will rupture with profuse hemorrhage and, unless the precaution has been taken to control the main vessels proximally, furious hemorrhage will obscure the field resulting in alarm, hopeful blind groping, injury to undamaged structures and an exsanguinated patient.

ADEQUATE OPERATIVE EXPOSURE is a prerequisite in controlling secondary hemorrhage. Illustrations in most standard textbooks of the surgical approaches to vessels are inadequate in that they do not provide for exposure at unusual sites, nor does the extent of the incision give the range of exposure needed in war injuries. A long incision, on the other hand, will provide generous exposure of the vessels, allow inspection of accompanying nerves, hasten the operation and overcome many difficulties for the surgeon. The text "Extensile Exposure" by Henry, and the works of Fiolle and Delmas will be of great assistance to anyone dealing with secondary hemorrhage and vascular injuries.

PROCEDURE: After exposure of the vessels a large amount of clotted blood and the ruptured sac

surrounding the vascular injury will be found. The sac may be attached to the vessels and give a clue to the location of the injury. On its exterior, the sac appears to be an old hematoma; on its interior it is hollowed out, with somewhat the appearance of the cover from a golf ball. After the damage to the vessels has been surveyed, decision must be made to repair the vessel wall by suture or to ligate above and below and excise the lesion. The extent of the injury will determine the procedure. If the rent is such that the wall can be restored, this should be done by an everting suture of fine silk. In popliteal artery injuries repair should be performed if at all possible, for early ligation of the popliteal artery is almost invariably followed by gangrene of the foot and leg requiring an above knee amputation.

If, as is usually the case, repair is not feasible or necessary, the lesion should be doubly ligated above and below the injury with strong silk suture and the lesion excised, rather than ligated in continuity. The tourniquet should then be released and any small bleeding points ligated to obtain complete hemostasis. The fascial envelope should not be resutured if it is difficult to close or if it will constrict and impede blood flow through the extremity.

Fasciotomy may become necessary postoperatively and is occasionally useful in the forearm or leg after ligation of the brachial or popliteal artery. If postoperative swelling constricts the limb distally threatening the blood supply to the part, incision of the fascia will accomplish much more than sympathectomy. When the fascia is incised, the underlying compressed muscle will bulge into the wound. The muscle is often white and ischemic, with the appearance of raw fish. The return of blood supply will often be manifest within a few minutes and the muscle will regain its normal red color and the extremity will become warm again.

POSTOPERATIVE CIRCULATION distal to the vascular injury can be roughly judged by comparing the warmth of the two limbs. If the distal part of the limb becomes cool after operation, which is unusual, 1000 cc of 2/10% procaine Hcl intravenously twice a day for one to two days should be administered to relieve vasospasm. Likewise, procaine sympathetic blocks are used twice a day in patients showing impaired circulation after operation. Sympathectomy is not necessary as a routine procedure. Often the limb on the ligated side will be warmer than on the sound side. Following ligation there is usually adequate blood supply to nourish the limb.

SURGICAL APPROACHES TO MAJOR VESSELS: The majority of secondary hemorrhages will occur from wounds of the extremities. A brief description of an approach to the principal vessels follows:

Common Iliac - Abdomen opened through a right or left rectus incision with mid point of incision opposite umbilicus. An infra-umbilical midline incision may be used but may prove to be somewhat low for easy work. Patient placed in Trendelenberg position, intestines walled off in upper abdomen, posterior peritoneum incised along the common iliac artery and vessels gently separated by blunt dissection and encircled with tapes. This preliminary procedure is valuable in control of bleeding from a high femoral artery lesion and may be temporarily necessary to control a bleeding gluteal artery.

Hypogastric - Infra-umbilical midline incision, Trendelenberg position, bowel displaced into upper abdomen and walled off. Posterior peritoneum incised alongside hypogastric vessels. Vessels gently dissected free. Ligation in continuity may be necessary to control a bleeding gluteal artery which has retracted and cannot be ligated.

External Iliac - Approached as for hypogastric artery or extraperitoneally through a long McBurney type incision. Is not generally as useful as common iliac in controlling hemorrhage distally due to rich anastomoses about hip from branches of hypogastric and profunda femoral vessels.

Femoral - The incision to expose the femoral vessels will lie on a line drawn from midpoint of inguinal ligament distally to the adductor tubercle. The site of incision along this line is governed by the location of the vascular injury.

At Femoral Triangle: Incision from inguinal ligament distally along "femoral vessel line," retract saphenous vein, incise deep fascia and expose vessels by blunt dissection.

In Hunter's Canal: Incise deep fascia, retract sartorius muscle. Incise fibrous roof covering Hunter's Canal carefully and expose the femoral vessels which lie immediately beneath the fibrous roof.

Profunda Femoral - Incision from inguinal ligament distally along course of vessels. Incise deep fascia, expose common femoral artery immediately below inguinal ligament, dissect distally. Profunda will be found 1 to 2 inches below inguinal ligament arising from posterolateral aspect of femoral artery.

Popliteal - Medial incision along femoral vessel line from adductor tubercle of femur proximally. Incise deep fascia, retract sartorius backward, identify adductor longus tendon, insert finger medially between these structures into popliteal fossa and hook around popliteal vessels.

Anterior Tibial - Anterolateral incision on leg at lateral border of tibialis anticus muscle, divide deep fascial envelope, develop plane between tibialis anticus muscle medially, and extensor digitorum longus muscle laterally. Anterior tibial vessels and deep peroneal nerve will be found deep between these muscles on interosseous membrane.

Posterior Tibial vessels, lower two-thirds - Medial incision on leg one finger-breadth posterior to medial border of tibia. Split deep fascia, retract gastrocnemius muscle, divide attachments of soleus muscle along medial border of tibia, develop plane beneath soleus and expose posterior tibial vessels and posterior tibial nerve.

Upper one-third: Patient face down, posterior midline incision from crease of knee distally, retract short saphenous vein and sural nerve. Divide deep fascia and split gastrocnemius in midline between its medial and lateral heads. Retract the two halves and split the underlying soleus longitudinally, in the midline, in the direction of its fibers. This exposes the upper portion of anterior tibial, the posterior tibial and peroneal vessels and posterior tibial nerve.

Peroneal Vessels - Exposed through same approach as posterior tibial at the various levels.

Axillary - Expose as in a radical breast amputation. Long curvilinear incision from anterior surface of shoulder along deltopectoral groove, thence medially and downward below clavicle to near border of sternum. Undermine skin flaps upward and downward, hook a finger about insertion of pectoralis major tendon and sever close to humerus. Reflect pectoralis major medially, severing its clavicular attachments, palpate coracoid process and identify pectoralis minor muscle. Sever pectoralis minor at coracoid process and reflect muscle downward. Incise costo-coracoid membrane and vessels will be found beneath this layer.

Brachial - Abduct the arm. Incision lies along line from apex of axilla to midcubital space. Incise along medial border of biceps, incise deep fascia and retract biceps. Identify and retract median nerve and expose vessels.

Brachial at Elbow: Incise along medial border of biceps tendon to crease of elbow, then transversely across elbow to medial border of brachioradialis, then distally along border of same muscle ligating superficial veins. Incise lacertus fibrosus and deep fascia of forearm which forms a roof over brachial artery. The artery lies beneath the lacertus fibrosus with biceps tendon laterally and median nerve medially.

Radial and Ulnar Arteries immediately below elbow: Use same approach as for brachial at elbow. Incise deep fascia and lacertus fibrosus, retract pronator teres and trace vessels distally. The ulnar artery dives deeply and quickly beneath the pronator teres and can be followed only a short distance. The radial artery runs under cover of brachioradialis muscle and is easily followed distally.

Ulnar Artery in lower two-thirds of forearm - Volar incision on a line from medial epicondyle to pisiform bone. Incise deep enveloping fascia, retract flexor carpi ulnaris muscle backward. Ulnar vessels and nerve lie under cover of this muscle.

Radial Artery, lower two-thirds of forearm - Incise along the medial border of the brachioradialis muscle. Incise deep enveloping fascia and retract brachioradialis laterally to expose radial vessels beneath.

Summary

1. Underlying vascular injury may not be evident initially.
2. Positive signs of vascular damage will usually develop within a few days to a month.
3. If the artery alone is injured, a traumatic aneurysm develops which is prone to rupture.
4. If artery and vein are injured, an arteriovenous fistula or aneurysm forms, which may rupture.
5. Secondary hemorrhage is more common from infected than clean wounds.
6. Hemorrhage most often occurs from the 8th to 18th days.
7. Impending hemorrhage is denoted by sudden increase in size of the hematoma, increased local pain, or intermittent oozing of dark or fresh blood from the wound.

8. Ligation of a major vessel should be delayed when possible to allow development of collateral circulation.
9. Immediate operation is indicated if hemorrhage has occurred or appears imminent.
10. A severe hemorrhage which has stopped spontaneously will almost always recur when the blood pressure is restored.
11. Packing of Gelfoam and similar materials into a hemorrhaging wound will rarely control the bleeding permanently.
12. Strong non-absorbable ligatures should be used.
13. As a safety measure during operation the main arterial and venous trunks must be controlled proximal

to the vascular lesion, either by a tourniquet or encircling tapes.

14. Operative incisions must be long, properly placed and give wide exposure to the vessels.

15. Wounds of major arteries should be repaired if possible; otherwise ligated and excised.

16. Fasciotomy of forearm or leg may in certain instances prevent gangrene following proximal ligation of major blood supply.

17. Sympathectomy is not necessary as a routine procedure following ligations. Intravenous procaine and sympathetic blocks are useful.

18. It is rare for the postoperative circulation to be insufficient to support the limb even though large vessels have been ligated.

CLOSTRIDIAL MYOSITIS

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1. INTRODUCTION:

Among the important infections encountered in war-time, those due to the clostridia are the most dramatic and life-endangering. Because some of these cases are characterized by the development of gas and gangrene, they have been referred to classically as "gas gangrene". It was observed during World War II that many, and in fact the majority, of these cases showed neither gas nor gangrene in the tissues and many were not recognized, therefore, until post-mortem examination. It was noticed, further, that some cases exhibiting gas, gangrene, and malodor did not show alarming systemic reaction and needed no more surgical treatment than adequate incision and drainage with excision of devitalized necrotic tissue. (See page 79)

The term "gas gangrene" was abandoned because it jeopardized both life and limb. Patients were lost from clostridial infection while the physician awaited the development of gas and gangrene; limbs were amputated because of the presence of gas, gangrene and malodor when they might have been saved. It was thought preferable to adopt the term "clostridial myositis" for the serious, life-endangering infection, and, for want of a better term, "anaerobic cellulitis" for the benign gas-forming suppuration in devitalized tissue. The "gas abscess" described

in World War I and observed repeatedly in World War II falls into the latter group.

Table I lists some of the differences between clostridial myositis and anaerobic cellulitis.

2. ETIOLOGY OF CLOSTRIDIAL MYOSITIS:

Clostridial myositis is a disease which complicates wounds contaminated with soil, clothing, and other foreign bodies. The responsible bacteria are the clostridia, particularly the saccharolytic group. The common organisms implicated are: *Clostridium perfringens* (welchii), *Clostridium oedematiens* (novyi), *Clostridium sordelli*, and *Clostridium histolyticum*. Others are found less commonly, and *Clostridium sporogenes*, though commonly found is thought to be a non-pathogen, ordinarily.

These organisms do not ordinarily gain a foothold unless some devitalized tissue is present for them to begin multiplying. The organisms may continue to grow in the devitalized tissue, producing gas and malodor without invading healthy tissue (anaerobic cellulitis), or they may extend very promptly into previously healthy muscle and produce a violent systemic reaction (clostridial myositis).

TABLE I

<u>Clostridial Myositis</u>	<u>Anaerobic Cellulitis</u>
1. Severe constitutional reaction	1. Mild constitutional reaction
2. Increase in pulse rate out of proportion to rise in temperature	2. Fever and rapid pulse as in any infection
3. Mental symptoms prominent	3. Mental symptoms not remarkable
4. Pain in affected limb prominent	4. Pain a minor complaint
5. Gas is often absent from tissues	5. Gas often very abundant
6. Malodor often absent	6. Malodor always present
7. Gangrene often absent	7. Gangrene, necrotic tissue always present
8. Pure growth of clostridia	8. Growth of clostridia along with multitude of other organisms
9. Clostridia invade previously healthy tissue	9. Bacteria grow in devitalized necrotic tissue only

Certain types of wounds predispose to the development of clostridial myositis. The disease is very uncommon in the face, head and neck. Elsewhere, however, any unbridged wound is likely to lead to the development of clostridial myositis. Penetrating wounds, inadequately debrided or not debrided at all, are particularly prone to develop the disease, especially such wounds about the trunk and buttocks. Extremity wounds are especially subject to develop the disease and particularly so when the major blood supply has been interrupted. Interruption of the arteries, however, is not essential to the development of the disease. In a study of some 160 cases of clostridial myositis in World War II, primary interruption of a major artery had occurred in only about 40%. On the other hand, compound fractures were present in two-thirds of the cases that developed the disease. A corollary to the above remarks is that meticulous debridement of all wounds, especially those about the buttocks and those in the extremities with vascular injury and compound fractures, is the best prophylaxis against the disease.

3. TYPES OF THE DISEASE (CLOSTRIDIAL MYOSITIS):

All cases exhibit a severe toxic systemic reaction, with early mental symptoms and finally with cardiovascular collapse. In general, however, two major groups are recognized: (a) One group which is characterized by the formation of large amounts of gas in the involved tissue but relatively little edema fluid, and referred to as the "Dry Type". (a) A second group which is characterized by little or no gas formation but with marked accumulation of edema fluid, referred to as the "Wet Type". Except for this difference in gross appearance and for the fact that pain is a less prominent symptom in the Wet Type than in the Dry Type, the two groups follow essentially the same clinical course. Bacteriologic study has not shown a preponderance of one type of organism in one or the other.

4. DIAGNOSIS:

The diagnosis of clostridial myositis depends upon alertness on the part of the physician and constant awareness of the possibility of this condition among battle casualties. This is of more than just academic interest because successful treatment depends primarily upon early diagnosis. Too many cases have not been diagnosed until autopsy and too many have been abandoned as being in "irreversible shock".

The diagnosis is made clinically and not bacteriologically. The latter is slow and painstaking. By the time the organisms are discovered bacteriologically, the patient is either dead or well. The disease is rapidly fatal if untreated. Death has occurred from the disease as early as five hours after wounding. Most of the cases may be diagnosed between two and three days after wounding. Very few cases occur after five or six days from the time of wounding.

In war wounds of the trunk, buttocks, and extremities, clostridial myositis must be suspected when the patient does not appear to be following a normal benign course. The clinical features and predisposing factors have been outlined above. X-ray examination of the involved part may be helpful. The delicate distribution of gas along muscle fibers and bundles is characteristic of the disease, but it must be remembered that if present at all, gas formation is a relatively late manifestation and many

cases die without demonstrable gas formation. Irregular, spotty accumulation of gas in tissues with extension along fascial planes and under the skin is not characteristic of clostridial myositis, but rather of anaerobic cellulitis. The presence of such gas in tissue is never, per se, an indication for amputation. It must be remembered, further, that missiles often carry air with them into the tissues and such gas does not mean infection at all.

It is sometimes impossible to distinguish clinically between clostridial myositis and anaerobic cellulitis. Before amputation is done or a policy of watchful waiting is adopted in such cases, biopsy examination of the suspected tissue should be done in the operating room. In clostridial myositis, muscle at a distance from the primary wound will be discolored, putty-like in consistency, non-contractile, and an impression-smear will show a pure culture of clostridia with few or no pus cells. In anaerobic cellulitis, even a millimeter or two from the primary wound, the muscle will be entirely normal.

5. PREVENTION:

The most important factor in the prevention of this disease is adequate debridement of contaminated wounds. Wounds must be left open because the entrapment of contaminated tissue beneath the skin is a sure way for clostridial myositis to develop. Every effort should be made not to compromise the circulation. The first plaster casts applied to extremities, for instance, should always be bivalved. The suturing of wounds "loosely" or the suturing of wounds over a gauze pack or drain is a snare and a delusion. Wounds could be closed primarily if one can be certain that all contaminated and devitalized tissue is excised, but this is rarely possible, if ever. This viewpoint is not modified by the use of any of our present antibiotics and in whatever dosage. To be sure, the use of antibiotics and of chemotherapeutic agents has improved the prospects, but it has not taken the place of good surgery. Prophylactic gas-gangrene antitoxin has not been helpful and is not recommended.

6. TREATMENT OF CLOSTRIDIAL MYOSITIS:

When the disease is present throughout the tissues of a limb, the procedure of choice is amputation above the extent of the infection, if possible. Before the use of antibiotics was possible, local excision or debridement of infected tissue was never successful. The patients always died of the infection. Since the use of penicillin (and most recently of terramycin), it has been possible to save patients in whom only local excision and drainage was possible (infections in the trunk, buttocks, hip, etc.). Furthermore, it has been possible to salvage extremities which had not been irreparably damaged, as in the cases where the disease was confined to the anterior tibial muscular compartment. In such patients it has been possible to resect all muscles contained within the fascial compartment and thereby save the limb. This was not possible before antibiotics in adequate dosages became available. It is important to re-emphasize that in anaerobic cellulitis, amputation is not necessary except where the extremity is damaged irreparably. All that is needed is adequate debridement and drainage.

Therapeutic gas gangrene antitoxin has not affected the mortality statistics in clostridial myositis. Antibiotics, however, are of unquestioned benefit in

large doses. It is recommended that penicillin, in doses of 4,000,000 units (6 to 7 grams) a day and streptomycin 2 grams a day be used parenterally and simultaneously. Supportive therapy is important. These patients are usually anemic and dehydrated. Blood transfusion and a fluid intake to assure an adequate urinary output are indicated.

SUMMARY:

1. Clostridial myositis is a common disease among the severely wounded.
2. Early diagnosis depends upon alertness to the possibility of this disease among battle casualties who are not convalescing normally.
3. Battle casualties should be watched for the possibility of this disease especially during the first 5 or 6 days after wounding.

4. One must not await the development of gas and gangrene for the diagnosis.
5. Malodor is not pathognomonic of this disease.
6. The primary consideration for prophylaxis is adequate debridement of the wounds incurred. Neither antibiotics nor antitoxin will prevent the disease in the face of injudicious surgery.
7. The treatment is amputation when necessary for irreparable damage of a limb or for marked toxicity. Local excision when a useful limb can be preserved or where amputation is not feasible (trunk, buttocks, hip and groin) is indicated provided the patient can be watched carefully through his first week of convalescence.
8. Antibiotics (penicillin and streptomycin) in large doses, combined with adequate surgery are life-saving agents.

DIFFERENTIATION AND TREATMENT, BOTH THERAPEUTIC AND PROPHYLACTIC, OF CLOSTRIDIAL MYOSITIS AND ANAEROBIC CELLULITIS

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For practical purposes, it may be stated that the war surgeon will encounter two types of gas gangrene infection; Clostridial Myositis, which is almost always associated with interruption of a major artery and usually requires amputation of the involved extremity; and Anaerobic Cellulitis, while being caused by the same group of organisms, is not associated with the interruption of major vessels and rarely requires amputation. One has only to keep these thoughts in mind to realize how vitally necessary the early differentiation of these two conditions becomes. This would also imply that if a case of anaerobic cellulitis were incorrectly diagnosed as clostridial myositis an extremity might needlessly be removed.

Another point to be stressed is that the diagnosis is made clinically and not by any one laboratory aid such as quick cultures of organisms or x-ray. Indeed, our experiences with the acrolein (quick culture) method have certainly been equivocal when the culture report is compared with the findings at operation and subsequent examination of the amputated extremity as well as the clinical condition of the patient. X-ray, of which more will be said later, has proven a valuable aid in establishing a diagnosis.

Clinical picture in Clostridial Myositis: Usually 3-4 days after injury to an extremity, either with or without previous debridement, the patient appears ill out of all proportion to his wounds. Extreme toxicity, dehydration, sunken eye balls, elevated pulse rate and temperature (102°-103°), and lowered hematocrit (14 mm in one of our cases) due to hemolysis by liberated toxins are common findings. Disorientation and euphoria are sometimes present and indicate an advanced stage of the process. Progress is very rapid and fulminating so that in 6-12 hours the patient is observed to have rapidly gone down hill. The injured extremity has a pungent, fetid, foul odor. Edema of both the skin and underlying tissues is present as well as a mottled purplish color and bleb formation. Crepitation is usually present but not always. The dressings are usually soaked with a serosanguineous exudate. Examination of the wound reveals pale pink, ischemic, necrotic muscle and pressure on the sides of the wound allows gas to escape from its depth. X-ray taken at this

stage will usually show gas dissecting along the fascial planes in a characteristic manner in contrast to the gas formation in anaerobic cellulitis in which small pockets of gas will be seen to collect between muscles but not dissecting along fascial planes. This fascial plane dissection has been attributed to the great gas pressure generated and indeed it is not uncommon, in advanced cases, to find, as an example, gas from a wound in the upper third of the forearm which has dissected its way up to and into the pectoral muscles extending almost to the midline.



Patient 13 hours after admission to the hospital. Patient had clinical and roentgenological clostridial myositis. Note fascial plane dissection.

The treatment of this condition is guillotine amputation above the site of necrosis provided all tissue distal to the wound site is necrotic as is almost always the case. If this is impossible (as in the case described above where gas and necrosis had involved the pectoral muscle group), amputation or disarticulation as high as possible and adequate debridement of the remaining necrotic tissue will usually suffice. The stump should be loosely dressed and 7-8 lbs. of skin traction immediately applied. It is surprising how quickly recovery takes place following operation.



This film demonstrates fascial plane dissection in clostridial myositis as a result of a supracondylar gunshot wound which was incurred four days prior to the taking of this picture.

Clinical picture in Anaerobic Cellulitis: The picture presented is usually one of distinct contrast to that of clostridial myositis. Toxicity and constitutional symptoms are much less prominent. Temperature (100°) and pulse are only slightly elevated and rarely does hemolysis occur. Sensoria are clear and progress of the disease is slow. The involved extremity has the same appearance, however, as in clostridial myositis, and crepitation and appearance of the wound are much the same, although blotching of the skin may be less marked due to lack of major vessel interruption.

Treatment of this condition consists of wide debridement of all necrotic tissue. Rarely is amputation required although in one of our cases, after inspecting the depth of the wound, it was found that both the anterior and posterior muscle compartments of a leg were necrotic which made amputation necessary.

Prophylactic Treatment: The author has managed 45 cases of clostridial myositis since the onset of the Korean conflict as well as an equal number of cases of anaerobic cellulitis. Most of these cases, upon arrival at the hospital, had previously been debrided. A word about debridement - this implies the removal of all dead, necrotic tissue from a wound. Failure to do so only provides a lush culture media for a variety of organisms. The timid surgeon can do only harm to his patient if debridement is inadequate. Therefore, it follows that the prophylactic care, and by that is meant the initial debridement, of these two gas infections must be adequate in all respects. If all necrotic tissue is removed the organisms concerned are unable to propagate. As usually all cases of true clostridial myositis are complicated by the severance, interruption or blockage (as in edema) of a major arterial vessel, such patients especially must have a wide debridement and be closely observed during the next 4-6 days for the development of ischemic necrosis with consequent clostridial infection even though initial debridement was adequately carried out. Clostridial infection in parts other than the extremities is rare due to the adequate collateral circulation present. After removal of all necrotic tissue, the wound should then be thoroughly cleansed with a mixture of G-11 (phisoderm with 3% hexachlorophene) and hydrogen peroxide (or any soap solution if the former is not available), washed out well with sterile saline or water, and loosely dressed with a dry dressing. The use of vaseline gauze is ill advised as this will form a sealed compartment. Antibiotic therapy in the form of large dosages of penicillin (two to four million units daily) and streptomycin (two grams a day) mixed in 2000 cc of 5% glucose in water are given as a constant intravenous drip. The value of antitoxin, either the trivalent or polyvalent, appears questionable. Other supportive measures include blood transfusions, early oral feeding, and careful observation of the urinary output for the possible onset of renal shutdown (lower nephron nephrosis).

Summary:

1. Emphasis is placed on the clinical condition of the patient in differentiating clostridial myositis and anaerobic cellulitis.
2. Prophylactic treatment consists of wide, adequate debridement.
3. Therapeutic treatment of clostridial myositis is almost universally amputation, whereas anaerobic cellulitis requires wide debridement, rarely amputation.

TREATMENT OF GUNSHOT WOUNDS OF THE HAND

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There are two main groups of gunshot wounds of the hand producing entirely different types of injuries: the first, grenade or mortar blasts which destroy

all or large parts of the hand, and secondly, machine gun or rifle bullets which generally penetrate entirely through the hand rarely leaving any metallic

foreign body within the hand. In high velocity types of rifle bullet, the point of entrance and exit is usually small unless the shot is fired at close range such as is found in self inflicted wounds of the hand. The bone is struck, usually fractured in multiple small diamond shaped pieces which heal well under traction. In high velocity types of bullets there is seldom much infection or foreign bodies present. The high explosive type of injury usually produces such severe damage that either fingers or metacarpals may have to be amputated. The wounds are dirty and filled with clothing or dirt. There is also considerable tissue destruction from the heat. The treatment of these two types of wound varies. The early treatment of high velocity injuries to the hand should be, first, after thoroughly cleansing the wound, shaving the hair of the hand, and careful debridement, excision of a minimal amount of skin about the wound of entrance and exit excising all the destroyed or necrotic muscle and leaving the wounds open. These wounds should not be packed through and through with vaseline gauze. The fractures of the metacarpals should have traction applied through the fingers and plaster cast immobilization. The hand or digit should not be completely immobilized in plaster for fear of gangrene as a result of swelling and edema. Nerves and tendons are saved when possible and the hand is placed in the position of function so that there is free movement of the uninvolved parts of the hand. These hand wounds should be evacuated immediately to the communication zone for further definitive treatment. In wounds with large points of exit as a result of explosive effect, a thorough debridement of the entire tract should be made, wounds left open and not packed with vaseline gauze. All devitalized

tissue should be carefully debrided and the hand immobilized in a half circumference cast or volar splint leaving the uninvolved areas free so that free movement may be allowed these parts. Post-operatively the limb should be kept elevated either on pillows or splints so that the hand is higher than the arm to prevent or cut down the amount of swelling and edema. After surgery all closed dressings or casts should be split entirely through to the skin for the full length of the dressing to prevent circulatory embarrassment. When the wound is sufficiently clean as seen in the hospitals in the communication zone, it may be closed. This period of time is generally approximately three weeks. Wounds that are too extensive to allow closure may either be covered with a split thickness skin graft or a pedicle graft. Dressings should be infrequent, splinting being maintained until the wounds have healed. In this period of time the hand should always be kept in the position of function with only the injured parts splinted. The remainder of the digits should be left free to move to complete range and there should be careful daily supervision of motion by the doctor and the physiotherapist.

The importance of good early treatment cannot be overemphasized and in order to get good or better results in the treatment of wounds of the hand it is important that the proper type of anesthesia be used. The hand cannot be debrided with local anesthesia. A general anesthesia or brachial block should be used and tourniquet, preferably an Esmarch or pneumatic type, should always be used. Unless one has a good view of the operative field he cannot adequately debride the wounds.

EMERGENCY TREATMENT OF CHEST INJURIES

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The patient's blood pressure, pulse and respirations should be recorded frequently since reaccumulation of blood in the chest with mediastinal shift is characterized by rise in pulse and respirations and fall in blood pressure. If two or three thoracenteses and administration of more than 1000 or 1500 cc. of blood are required within a 12-hour period without stabilization of the patient's condition, exploratory thoracotomy for control of bleeding probably will be required. This should be performed under intratracheal general anesthesia through a posterolateral incision with resection of one rib to provide adequate exposure. After control of bleeding, an intercostal drainage tube, size 30 or 32 French, should be placed in the 7th or 8th interspace in the mid-axillary line before the chest is closed. This tube should be attached to an underwater drainage set immediately post-operatively.

Large defects of the chest wall: In general these injuries are associated with a severe degree of shock requiring immediate and sustained therapy. The principle of treatment is that of debridement with thorough removal of bone fragments, after which the adjacent tissues are mobilized and approximated. However, this extensive treatment is best deferred until the patient can be transported to a general hospital. Interim therapy should be directed toward provided as airtight a temporary dressing as possible.

Simple rib fractures: Simple fractures of one or

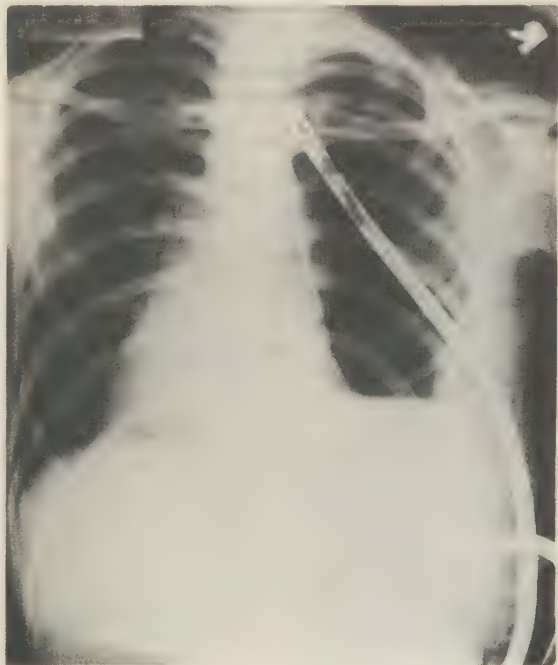
two ribs without displacement generally require no specific treatment. More extensive fractures, or fractures with displacement and paradoxical respiration require that the affected hemothorax be strapped. Three inch adhesive bandage is placed from the midline anteriorly to the midline posteriorly; several inches of chest wall above and below the sites of fracture should be included.

Subcutaneous emphysema: Subcutaneous emphysema of itself requires no specific therapy. Its importance lies in its indication that an underlying pneumothorax may be present; the latter should be treated by aspiration or drainage as outlined above.

Sedation: Depression of the cough reflex to a degree insufficient to accomplish removal of bronchial secretions must be avoided in prescribing sedatives and analgesics. Demerol, in a dose of 50-100 mgm. depending on the size and condition of the patient, is considered suitable. The dose should not be repeated more often than every 6 hours. The use of opium derivatives in chest injuries is discouraged.

Early evacuation: Treatment of thoracic injuries in the field is directed toward the prevention of mortality and reduction of morbidity by supplying the patient with adequate pulmonary exchange, and by controlling shock. Definite treatment should be initiated as soon as possible, and this aim will be secured by evacuation of the patient to the Chest Section of a fixed hospital as soon as he may be safely

M.A. was wounded on 10 February 1951. On 2 March a right thoracotomy was done at a MASH, as shown in picture #1. He was admitted to the Tokyo Army Hospital, 7 March and dependent drainage was established 8 March as shown in picture #2. On 5 April, decortication was done at the Tokyo Army Hospital and the patient is doing well.



A tube placed in this manner cannot possibly drain the chest adequately.



Open thoracotomy using large tube at most dependent portion of chest is effective.

transported.

The well-established principle of restoring normal physiology as soon as possible is of paramount importance in the care of thoracic injuries.

The fundamental treatment of shock is not changed because of the presence of a thoracic injury; however, the nature of the lesion makes certain modifications necessary. The administration of blood is governed, as in shock due to other causes, by clinical evaluation of the patient and frequent observations of the pulse and blood pressure. Oxygen should be administered as soon as possible, the method of administration being decided by facilities available in forward areas.

In general, the ideal position of the patient with a chest injury is that in which the trunk is elevated at an angle of 45 degrees. The position of the patient should be changed every hour, alternating between the back and the affected side; the patient should not be allowed to rest on his uninjured side. The patient should be encouraged to cough at least every hour; cough is most beneficial when the patient is able to sit up in bed. Penicillin, 300,000 units, should be given intramuscularly twice daily; the use of other chemotherapeutic agents is guided by the nature of the infecting organism and the state of the wound.

Sucking wounds of the chest: As soon as possible

after it is sustained, a sucking wound of the chest must be closed with vaseline gauze and an air-tight dressing. After the patient has been evacuated from the forward areas, the wound should be debrided and closed in layers without drainage. Water seal closed drainage of the pleural cavity is seldom necessary in uncomplicated sucking wounds, but may be necessary if extensive pulmonary parenchymal damage with a bronchopleural fistula is present. In this instance the danger of a tension pneumothorax is usually obvious; if there is doubt, it is advisable to aspirate air from the chest at frequent intervals. If the lung fails to expand, and the intrapleural pressure rises again after aspiration, closed drainage should be carried out. Introduction of the catheter is best done under general anesthesia. A large No. 30 French catheter is introduced into the pleural cavity through a stab wound in the seventh or eighth costal interspace in the mid-axillary line. The position of the tube is maintained by a silk suture passing around the catheter and anchored to the adjacent skin.

A water seal drainage may be constructed from a 1000 cc narrow neck flask (of the type in which intravenous fluids are commonly supplied) fitted with a rubber stopper with two holes. The flask is one-third filled with saline, and through the holes in the stopper two glass tubes are introduced. The shorter of these tubes is placed well above the surface of the fluid, and provides an avenue of escape to the outside for air above the surface of the fluid. The longer of these tubes is introduced to a depth of one centimeter beneath the surface of the fluid, and



K.K. was wounded on 19 February 1951. On 28 February a left thoracotomy for drainage of infected hemohydrothorax was done at a MASH as shown in above picture. Patient was admitted to the Tokyo Army Hospital on 6 March. The thoracotomy was not in a dependent position for a satisfactory drainage. This patient should have been evacuated before the empyema ensued. Decontamination was done at the Tokyo Army Hospital on 29 March and the patient is doing well.

the tube leading from the pleural cavity is connected to the end of this glass tube. The bottle should never be raised to the level of the thorax unless the

catheter is clamped. The tube should be clamped whenever the patient is transported.

Hemothorax: Aspiration of blood from the pleural cavity should be carried out as soon as diagnosis of hemothorax is made; early expansion of the lung is thus achieved, and infection or organization of the clot is avoided. Aspiration should be carried out daily until no blood is obtainable; as much blood as possible should be removed at each aspiration. Blood loss by this route must be replaced by transfusion, as indicated by studies of the patient's hemoglobin. At the completion of each aspiration, 300,000 units of crystalline penicillin and one gram of streptomycin, both dissolved in 2-3 cc. of isotonic saline, should be introduced into the pleural cavity. Thoracentesis for hemothorax is carried out with a 15-17 gauge needle, connected through a three-way stopcock to a 30 cc. syringe. The needle may be introduced through the eighth or ninth costal interspace, posteriorly or laterally. Use of the three-way stopcock obviates aspiration of air while the syringe is being emptied.

Closed thoracotomy with intercostal catheter drainage attached to underwater seal is not recommended for treatment of simple hemothorax. This form of treatment results in a higher incidence of empyema. In addition, should thoracentesis be necessary after removal of the intercostal tube, it is more difficult because of fluid loculations resulting from adhesions produced by the presence of the tube. Furthermore, in hemothorax closed drainage usually loses its value within 24 to 36 hours because of occlusion of the tube by fibrin and clots, and by pleural adhesions about the intrathoracic portion of the tube. Experience has shown that two or three thoracenteses require less time than closed thoracotomy with insertion of an intercostal tube so that the time factor is favored by thoracentesis.

Severe intrathoracic hemorrhage: Patients admitted with chest wounds who are in shock, and whose x-rays reveal massive hemothorax with displacement of the mediastinum to the opposite side, should be suspected of having severe intrathoracic bleeding. Immediate thoracentesis should be performed with aspiration of as much blood as possible, and simultaneous blood transfusion should be instituted.

EXPERIENCE AND TREATMENT OF CHEST WOUNDS IN A GENERAL HOSPITAL

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Restoration of normal respiratory and circulatory physiology at the earliest date is of prime importance in the management and treatment of thoracic wounds.

It is well understood that the lung is normally an air-containing organ expanded so as to be in contact with the chest wall. Through injury, the air spaces within the lung may be obliterated by compression from without, viz., by air and/or fluid, or by the presence of foreign material within the alveoli, viz., blood, foreign bodies or secretions. Treatment of thoracic injuries, therefore, is aimed at removal of any of these factors causing the obliteration of air-bearing tissue as soon as possible. Restoration of normal respiratory and circulatory function can be accomplished only by following this principle. War wounds, as a result of missiles propelled by explosives, may be defined

as penetrating or perforating types. Penetrating wounds are those resulting from entrance of a missile with retention of that object as a foreign body regardless of the size of the wound of entrance. There is no wound of exit. Perforating wounds result from the through-and-through passage of the missile with a wound of entrance and a wound of exit. As a result of these wounds, several pathologic changes may occur singly or in combination within the thoracic cage. These may be:

1. Hemothorax
2. Pneumothorax
3. Pneumonitis
4. Atelectasis
5. Empyema
6. Retention of foreign bodies
7. Injuries to the heart and pericardium

It is the purpose of this paper to discuss the treatment of patients with chest wounds who were admitted to the Thoracic Surgery Section at Tokyo Army Hospital between 1 September 1950 and 1 May 1951 during the Korean War. No attempt will be made to evaluate these cases with respect to the total number of chest casualties resulting from the campaign since accurate overall statistics are not yet available. Any conclusions made will be based solely on the experience gained in handling and observing the patients admitted to this hospital.

The cases in this study do not include those consisting of superficial wounds of the chest wall, but deal primarily with wounds of the intrathoracic viscera.

During the period indicated, 652 patients with intrathoracic wounds were admitted to the chest service. All patients were adult males ranging in age from 17 to 40 years. Of these, 442 or 67.8% were penetrating in type and 210 or 32.2% were perforating. 353 or 54.1% involved the right side of the chest and 289 or 44.4% involved the left side of the chest. Ten patients or 1.5% had bilateral chest wounds resulting from separate missiles or being wounded by one missile traveling transversely.

Routine Care: On admission to this hospital, all patients have a blood count, urinalysis and up-right chest X-ray performed. They routinely receive 300,000 units of procaine penicillin twice daily and, if indicated, 1/2 gram of streptomycin is administered at the same frequency. Patients are placed in beds having the head elevated to 45 degrees and encouraged to cough frequently. Sedation is kept at a minimum, and for severe pain demerol is given in doses of 50 to 100 milligrams every four hours.

Hemothorax: The most frequent complication of intrathoracic wounds is hemothorax with or without associated pneumothorax. Of the total number of patients admitted, 409 or 62.7% had this condition on admission or developed it within one week after admission. The policy here has been to treat hemothorax by simple thoracentesis without air replacement, performed under local procaine anesthesia. As much fluid as possible is removed when the diagnosis is made and the procedure is repeated every 24 hours until no fluid is obtained and the chest appears clear to physical and X-ray examination. Following removal of fluid, 300,000 units of crystalline penicillin in two to three cubic centimeters of normal saline solution is instilled. Specimens of the fluid removed are sent to the laboratory for culture and sensitivity to antibiotics as often as indicated. The antibiotic of choice is administered systemically and/or intrapleurally, if infection is present, depending on the manner in which the drug can be administered. Penicillin, streptomycin, aureomycin, chloromycetin and terramycin have been utilized. Of the patients with hemothorax, 386 or 94.3% (59.2% of all patients) were subjected to repeated thoracenteses. The remaining group had a minimal amount of fluid which absorbed spontaneously. 1,230 thoracenteses were done on this group or an average of 3.2 per patient. Several patients required only one aspiration, and one patient required 25 aspirations. He ultimately required a decortication.

Pneumothorax: Eight patients or 1.2% were admitted

with pneumothorax alone and absence of any intrapleural fluid. There were no cases of tension pneumothorax in this series. Treatment consisted of removal of air by needle aspiration and checking intrapleural pressures initially and before withdrawing the needle. 300,000 units of penicillin were instilled after each thoracentesis. In three instances the lung failed to re-expand on this regime and it was necessary to perform a closed drainage with an intercostal catheter in an attempt to accomplish expansion.

Pneumonitis and Atelectasis: This is primarily a diagnosis resulting from clinical and X-ray examination. There is a decrease in breath sounds over the area of the lung involved with slight dullness to percussion. Occasionally moist rales will be present. X-ray reveals an area of increased density, not conforming to any segmental pattern and indistinguishable from a patch of consolidation. 114 or 17.5% of the patients exhibited these findings. There was evidence of intraparenchymal hemorrhage and invariably the center of density represented the passage of a perforating missile, a retained foreign body, or lung underlying fractured ribs. Treatment of this condition consisted of parenteral administration of antibiotics, frequent coughing, and ambulation if the patient's general condition permitted. Retained foreign bodies will be discussed below. In atelectasis, bronchoscopy has been the treatment of choice. The pneumonitis generally has cleared under the above treatment in approximately two weeks.

Empyema: Gross infection of the intrapleural space can result from contamination by the missile, by clothing drawn in with it, or by small persistent bronchopleural fistulae. Diagnosis is made by clinical and X-ray findings and confirmed by culture of pathogenic organisms from the fluid removed by thoracentesis. Initial treatment consists of removal of infected fluid with systemic and intrapleural administration of appropriate antibiotics and eventual decortication. If the patient's general condition is such that he cannot tolerate decortication at that time, e.g., severe abdominal wounds, paraplegic, intracranial injuries, compound fractures, etc., the temporizing procedure of open drainage with resection of a rib segment is performed and patient can be evacuated to the zone of interior for ultimate decortication when his condition warrants.

Retention of Foreign Bodies: A large number of penetrating wounds result in retention of metallic foreign bodies. These vary in size, shape and location. It has been the policy of this hospital to remove all metallic foreign bodies greater than 1½ centimeters in size. Smaller foreign bodies in the region of the heart and great vessels and in pulmonary parenchyma are observed carefully by repeated X-rays and electrocardiographic examinations for at least one month. If there is no evidence of reaction about the object, and the patient's condition is satisfactory, these foreign bodies are not disturbed. Persistence or development of reaction about the missile indicates the need for exploration and removal. This is accomplished by open thoracotomy through a posterolateral incision with resection of a rib. An incision is made in the lung surface closest to the object and the missile removed. Infected lung tissue is removed by wedge or segmental resection.

Twenty or 3% of the patients under discussion have had foreign bodies removed. All 20 cases recovered from the operation and returned to duty. It should be noted that if at all possible foreign bodies are best left undisturbed for three to four weeks until local reaction about them has subsided. This obviates considerable unnecessary bleeding at operation.

Injuries to Heart and Pericardium: Seven or .8% of the total patients suffered injuries to the heart or pericardium. This low incidence is undoubtedly a result of the high mortality of similar wounds following the initial injury. Two of these patients had .30 calibre and .51 calibre bullets respectively embedded in the ventricular walls. These missiles were removed at thoracotomy. Four patients experienced pericardial effusion from small missiles in proximity to and within the pericardial sac. These were successfully treated by pericardiocentesis. All six patients recovered completely. The seventh patient had a small retained foreign body in the myocardium and succumbed to cardiac tamponade 24 hours after admission before operation could be performed.

Neurosurgical Complications of Chest Injuries: Forty-five or 6.9% of the patients also had neurosurgical complications such as paraplegia or intracranial injuries. The general principles of treatment have been the same, although there is considerable difficulty in adequately aspirating pleural fluid because of the horizontal position required on the Stryker frame in treatment of paraplegics. In addition, the ability to cough is usually lessened because of the paralysis of abdominal musculature and the position of the patient. All these patients were returned to the zone of interior because of their neurosurgical injuries.

Decortication: In a certain number of instances of hemothorax, the blood in the pleural space coagulates and begins to organize soon after injury. The cause for this is as yet not satisfactorily explained. In these instances removal of the coagulum by thoracentesis is impossible. The use of streptokinase and streptodornase in 18 such cases at this hospital has been unsuccessful in producing liquefaction of the clot. The coagulated blood may remain sterile or may become infected at any time despite liberal use of antibiotics. In either instance, decortication is the treatment of choice. The optimum time for this procedure has been 3 to 6 weeks from date of injury depending on the physical condition of the patient and the appearance of the chest X-rays. The operation here consists of thoracotomy through a posterolateral incision under endotracheal gas-O₂-ether anesthesia following pentothal induction.

A rib, usually the sixth or seventh, is resected and a plane of cleavage developed in the endo-thoracic fascia. As much thickened parietal pleura as possible is removed from the chest wall and diaphragm and all clot is evacuated from the thoracic cavity. The thickened "peel" overlying the collapsed lung is removed. The lung is re-expanded by positive pressure and any parenchymal tears are repaired. Foreign bodies may be removed during this operation. Two intercostal tubes are placed; one above anteriorly and one below posteriorly, and the chest is closed in layers. The tubes are attached to continuous low pressure suction and X-rays are taken daily for the next four to five days. The tubes are removed within 48 to 72 hours. The incidence of patients requiring decortication is not accurate because many patients who probably required surgery had to be sent to the zone of interior because of low evacuation policy. Decortications have been done at this hospital only when the policy exceeded 90 days. Therefore, 45 decortications have been done during this period. Of these, 37 or 82.2% have recovered and have returned to duty on an average of six to eight weeks following surgery. The remainder have been evacuated to the zone of interior because of other injuries or a poor result from the decortication.

Mortality: There were four deaths in this series. One, mentioned above, died of cardiac tamponade. One suffered severe abdominal wounds in addition to his chest injury and died 72 hours after closure of a disruption of his abdominal incision. One patient, with an empyema, died from pulmonary embolism. The fourth death was a paraplegic with a chest wound; he developed signs of increased intracranial pressure and died 24 hours after decompression of the brain by burr holes. The mortality rate was .6%.

SUMMARY

During the period 1 September 1950 to 1 May 1951, 652 patients have been admitted to the Thoracic Surgery Section at Tokyo Army Hospital. Only four deaths occurred, representing a mortality rate of 0.6%. 286 or 43.9% of all patients recovered fully and returned to duty. This figure is a result of many patients being evacuated to the zone of interior during the time when a low evacuation policy was in effect. Also, 342 patients or 52.4% suffered additional injuries, such as compound fractures, abdominal wounds, and central and peripheral nervous system injuries which necessitated evacuation. The incidence of hemothorax was 62.7% and of these, 94.3% were treated by thoracentesis. There was an empyema incidence of 7.9%. Forty-five decortications were performed for infected and non-infected organized hemothorax, and of these, 82.2% returned to duty.

TREATMENT OF PENETRATING CRANIOCEREBRAL TRAUMA

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It seems to be the general consensus that once a man is shot in the head, all powers are lost except those of vegetation. Such a fallacious conclusion is detrimental and might readily lead to complacency with a resulting "do nothing" policy. The story of a young Marine who was operated on by one of us during the

Okinawa campaign is a striking example, but of no exception, of total rehabilitation following extensive brain injury. This patient was received by the Neurosurgical Team of the Tenth Army four hours after he had been wounded by a shell fragment. Skin, scalp, bone and meninges, covering the greater portion of the left

frontal and temporal lobes, had been blasted away. There was a grossly contaminated, fungating, trans-ventricular wound, necessitating resection of major portions of the left frontal and temporal lobes. His convalescence was stormy. He remained semicomatose for many days. At time of evacuation to the Zone of Interior, he was still hemiplegic and aphasic. Though he seemed to understand some spoken words, he had available as a means of expression only one single word which he repeated continuously. A recent letter from the same young man who had seemed so hopelessly crippled when he was wounded six years ago, revealed that he had made his comeback. He has recovered from his hemiplegia, has relearned speech in years of hard work at one of the country's best aphasia schools, has graduated from college, and has accepted an appointment as instructor at the aphasia school at which he had studied.

The availability of antibiotics and of whole blood in the combat zone and in the Zone of Communications contributes to the reduction of morbidity and of mortality. The single most pertinent factor in the successful treatment of penetrating craniocerebral trauma is early definitive neurosurgical intervention. Incomplete "debridement" by the inexperienced is equally damaging as late craniotomy. In order to obtain maximum restoration of function, it is essential to resect the macerated tissue of the scalp, the destroyed bone, the damaged portions of the meninges, the necrotic brain tissue at site of penetration and in the depth, and to remove all indriven bone fragments and clots. While there are exceptions to any rule, the vast majority of cases with penetrating injury of the brain should then be sutured in individual layers with closure of dura, galea and skin. Nothing short of such an operative procedure which requires neurosurgical knowledge and experience will bring about the desired result. Consequently, it is necessary in combat action to have one and preferably two neurosurgical teams in support of an army. The work of such a team can be facilitated greatly by the endeavors of those medical installations through which the patient must pass in order to reach the neurosurgical team.

The Surgeon of the Far East Command provides two echelons for the specialized care of casualties with penetrating craniocerebral trauma: The First Provisional Neurosurgical Detachment which is attached to the 121st Evacuation Hospital, and the Neurosurgical Center at Tokyo Army Hospital.

It is the purpose of this communication to outline the essential emergency measures which must be instituted in forward installations as well as the general principles underlying the neurosurgical management of penetrating craniocerebral trauma.

GENERAL MEASURES

1. Examination Prior to Evacuation to Neurosurgical Team. Inspection of the head and a brief neurological examination will suffice to rule out a simple laceration of the scalp without associated intracranial pathology. The neurological examination should include a check of the pupils, the visual fields by confrontation, the function of the seventh cranial nerve, motor power and reflexes. All cases with craniocerebral trauma should be referred without delay to the Neurosurgical Team, and should be tagged accordingly.

2. X-Ray. Skull films prior to admission of the

patient to the neurosurgical station are deemed inadvisable. Time consumed in their preparation delays evacuation, and transportation of wet films is unsatisfactory. X-rays must be made, however, immediately prior to craniectomy. In order to plan his surgery accurately, the neurosurgeon must have preoperative information about the bony defect, the number and location of indriven bone fragments, and the location of any metallic fragments. Retained bone fragments are the most frequent single cause of post-traumatic brain abscess. Therefore, postoperative skull films also must be made to rule out the retention of isolated bone fragments. If the pineal body is calcified, its position might reveal a subdural or extradural clot which is not infrequently associated with a penetrating wound of the brain. In the postoperative films, determination of its position will serve to reveal, or to rule out, formation of a secondary hematoma.

3. Wound Care Prior to Evacuation to Neurosurgical Team. A wide area surrounding the site of penetration should be shaved and the scalp thoroughly cleansed. A dressing consisting of dry gauze squares and a bandage should then be applied. The use of adhesive tape on the head must be avoided. In fungating wounds, with brain tissue presenting at the surface of the scalp, gauze fluffs may be used, care being taken not to apply the bandage too tightly. Debridement of the superficial layers of the scalp which is an integral part of definitive surgery is deferred until such can be effected. At the Neurosurgical Detachment before operation, the entire head is shaved and thoroughly washed with soap and water for ten minutes. A sterile dressing is then applied until the patient receives his final preparation in the operating room.

4. Coma. Because of existing intracranial tension, patients with penetrating craniocerebral trauma exhibit various degrees of depression of mental alertness. Increasing intracranial pressure renders the patient stuporous, semicomatose, or comatose. Other signs and symptoms of increasing intracranial pressure include restlessness, nausea, vomiting, incontinence, bradycardia, hypertension, depression and irregularity of the respiratory rate. In the pre- and post-operative management of the comatose patient, the following considerations are of vital importance:

(a) Maintenance of free air passages - Mechanical obstruction of the air passages is a common cause of early death in the presence of coma. Such obstruction can be overcome and prevented by frequent intratracheal suction and by positioning of the patient. At the Clearing Station, or at the Mobile Surgical Hospital, intratracheal suction must be employed intermittently to rid the airways of mucus plugs. More important yet is the proper positioning of the comatose patient which is designed to facilitate drainage and to prevent aspiration of mucous and vomitus. It is inadvisable to keep a comatose patient flat on his back. The most effective position consists of placing the patient on his side with hips and knees flexed, the dependent arm behind the back, the chest supported by a blanket roll, and the head slightly anteflexed but aligned with the spine. *

An illustration of the coma position can be found in the article TREATMENT OF CLOSED HEAD INJURIES (Page 89)

In such a position, mucous and vomitus cannot be aspirated into the bronchial tree. In order to

oxygenate each lung to an equal extent, the patient must be turned from right to left coma position at least every two hours.

(b) Blood replacement and fluid maintenance - Whole blood should be administered intravenously whenever the red blood count is below 4,000,000 and the hemoglobin below 14 gm. The patient should be maintained in a normal state of hydration. An average of 2500 cc of fluid per 24 hours is usually adequate. In the event that this fluid has to be administered intravenously, saline should not be used in excess of 1000 cc of the twenty-four hour total.

(c) Urinary output - Many comatose patients are incontinent for urine. A certain number of patients with craniocerebral trauma, however, may have urinary retention for which all of them must be examined. In its presence, catheterization is in order and should be repeated every eight hours. Restlessness, though commonly caused by increased intracranial pressure, may be due simple to bladder distention in the unconscious patient.

A practical method of management of the incontinent patient was first used during the Okinawa campaign and has again proved its expedience. The patient is fitted with a condom, the tip of which is attached to a tube leading into a bottle on the floor. This prevents the soiling of blankets and sheets, and protects the patient's skin from exposure to urine.

(d) Other measures important for the management of prolonged coma - Special skin care and frequent turning is necessary in order to prevent decubital ulcers. Spontaneous bowel movements must be prevented by regular enemas because straining invariably causes a rise in the intracranial tension and may lead to secondary intracranial hemorrhage. Oxygen should be administered in the presence of cyanosis. False teeth should be removed. A padded tongue depressor should be attached to the patient's cot so as to be available in case of a seizure.

5. Antibiotics, Chemotherapy. Prophylactic administration of 600,000 units of penicillin and 0.5 gm streptomycin twice daily to every patient with penetrating craniocerebral trauma is advisable. Such antibiotics as aureomycin, chloromycetin and terramycin are reserved for the actual treatment of specific infections. The use of sulfa drugs in the field is contraindicated in the early phase of penetrating craniocerebral trauma.

6. Sedatives, Analgesics. The use of sedatives and analgesics in the presence of craniocerebral trauma is contraindicated for three reasons: (a) Those agents which are sufficiently potent to produce sedation and to relieve pain, have a tendency to increase intracranial tension and to depress respiration. (b) All sedatives and analgesics have a masking effect, and may impede the neurosurgeon in establishing indications for neurosurgical intervention. (c) The narcotic effects of these drugs may delay forcibly early surgery and may thus contribute to the degree of irreparable loss of function. In depriving the patient temporarily of rest and of relief from pain, it should be understood that restlessness and irrationalism are the direct sequelae of increased intracranial pressure. This condition can be relieved only by surgical intervention. Sedatives may set up readily a vicious cycle of increasing the pressure, by deepening the coma and, secondarily, increasing rather than relieving restlessness. It must be recalled also that increased intracranial pressure depresses the respiratory rate. Mor-

phine, for instance, has a similar effect on the respiratory rate which may be embarrassed catastrophically by summation of the two factors. The irrational, stuporous, or comatose patient is not sufficiently aware of pain to require a relief. The conscious patient with penetrating craniocerebral trauma who complains of headache should be reassured and told why his headache cannot be relieved until the necessary surgery has been performed.

SPECIAL MEASURES.

1. Scalp Laceration. The devastating sequelae of improperly treated scalp lacerations necessitate rigid adherence to neurosurgical operative methods. Secondary infection of a scalp laceration may lead to subgaleal abscess, to osteomyelitis, and even to intracranial infection. A cleanly sutured scalp laceration is further mandatory because of the frequent late appearance of a neurological deficit as a manifestation of previously unrecognized intracranial pathology necessitating neurosurgical intervention. Among the more frequent injuries of this type, outstanding is the tangential bullet wound of the scalp without associated bony injury but with underlying extradural, subdural, or intracortical/subcortical hematoma. An adequate expedient method of surgical repair of a scalp laceration is as follows:

- (a) Shave wide area surrounding laceration.
- (b) Cleanse skin surrounding laceration with soap and water for five minutes.
- (c) Prepare skin surrounding laceration with two coats of merthiolate and two coats of alcohol.
- (d) Drape with sterile towels.
- (e) Excise entire skin edge with scalpel.
- (f) Resect all layers of the scalp within the exposed area, including the periosteum.
- (g) Irrigate wound thoroughly with warm saline solution.
- (h) Close galea with interrupted sutures of 00 silk.
- (i) Close skin without drainage with interrupted sutures of 0000 silk.
- (j) Apply gauze dressing with collodion.
- (k) Remove skin sutures after 48 - 72 hours.

2. Compound Fractures of the Skull. Compound linear fractures without depression, in the absence of a neurological deficit suggesting intracranial pathology, may be treated surgically like a scalp laceration.

Compound fractures of the base of the skull as evidenced by a cerebrospinal fluid fistula may be treated conservatively for approximately ten days, as long as antibiotics are administered prophylactically. If a fistula does not close spontaneously by that time, surgical closure must be performed. The intradural approach with fascia closure of the dural defect is the method of choice.

Compound fractures of the vault require immediate craniectomy with debridement of the scalp as described under (II) (1) and with removal of all depressed and comminuted bone fragments. The dura is opened routinely so as not to overlook the commonly associated subdural hematoma or hydroma, or an intracortical/subcortical hematoma. The dura is then closed with interrupted sutures of 0000 silk. The scalp is closed in individual layers with interrupted sutures of 00 silk for the galea and 0000 silk for the skin. No drain is used. Tantalum cranioplasty is not performed for at least six months.

3. Penetrating Wounds of the Brain. This group in-

cludes all compound craniocerebral injuries with dural penetration. Represented in it are unilateral and bilateral injuries; tangential wounds as well as thru and thru wounds. They may be complicated by a ventricular tear, by laceration of a major blood sinus, or by involvement of an air sinus. As long as definite neurosurgery can be done early and adequately, even the transventricular wounds and those involving major blood sinus have a high recovery rate. Their surgical management is specialized just as that of the cerebral fungi. The latter are so named because of the herniated exposed brain tissue which has the appearance of a fungus. The etiology of a fungus can usually be found in a persistent cerebritis or a brain abscess and can be traced commonly to the retention of bone fragments or liquefied necrotic brain tissue within the shrapnel canal. It does not lie in the realm of this paper to discuss the technical details involved in the operative management

of the pathological variations of penetrating craniocerebral trauma. Their successful treatment consists of early definitive neurosurgical intervention, followed by alert, meticulous postoperative care. Repair of the bony defect by tantalum cranioplasty must be postponed for at least six months after the injury. Whenever the wound had been infected at one time or the other, tantalum cranioplasty should be postponed for nine to twelve months.

The goal of ultimate rehabilitation can be reached in the majority of patients with penetrating craniocerebral trauma as long as a concerted effort is made in behalf of the patient. This effort starts at the battalion aid station and does not end until the man who became a casualty as a soldier once again has resumed his place in society.

ANESTHESIA IN ACUTE CRANIOCEREBRAL TRAUMA

Captain Marie T. Jansen, ANC, Anesthetist, 1st Provisional Neurosurgical Detachment

The problem of anesthesia in acute craniocerebral trauma is often complicated by the presence of associated injuries of the chest, abdomen and extremities. These added to the problems posed by the decreased tolerance of acutely traumatized cerebral tissue for various anesthetic agents make the choice of a mode of anesthesia difficult and of the utmost importance. Because of the frequent presence of grossly contaminated and potentially infected wounds, and the frequent presence of irrational, restless behavior on the part of the patient, a rapidly induced general anesthesia on a light plane has been chosen rather than the more conventional local anesthesia. It is the purpose of this communication to describe such a method of anesthesia consisting of administration of Sodium Pentothal 2½% in conjunction with endotracheal nitrous oxide and oxygen.

Immediately after the patient arrives at the neurosurgical station, preparation for anesthesia and operation is begun. The blood pressure, pulse and respiration are determined and recorded and blood levels checked with hemoglobin and red blood cell determinations. If there is an undesirably low level, which is frequently the case, or if there is clinical evidence of shock, the patient is given a transfusion of whole blood while other preparations are being made. The initiation of anesthesia in the presence of shock or low blood levels is strongly contraindicated. Preoperative medication consists only of Atropine Sulfate .0004 gms.

While the patient is being prepared on the preoperative ward for surgery, the operating room is set up. Equipment for the administration of anesthesia includes:

1. Anesthesia Machine, Portable
2. Suction Machine
3. Endotracheal Tubes
4. Laryngoscope
5. Intravenous Solution, 5% Dextrose in Water
6. Intravenous Tubing with Attached Three-way Stopcock
7. Syringes (2) of Sodium Pentothal Solution 2½%
8. Vaseline gauze (for Protection of the Eyes)
9. Pontocaine Hydrochloride 1% (for Throat Spray)
10. Pontocaine Ointment (for Endotracheal Tube)
11. Bite Blocks, Airways, Tongue Depressors, Adhesive and Gauze

12. Catheters
13. Eighteen-Gauge Needles

The patient is then transported to surgery and placed on the operating table in the supine position. Blood pressure, pulse and respiration are again checked and recorded, and the accompanying blood reports inspected.

Intravenous administration of 5% Dextrose in water is begun through an eighteen-gauge needle. (Saline or Dextrose in Saline is contraindicated because of the salt-water retention effect on the cerebral tissues). Induction is effected with the slow injection of 4 - 5 cc of the Sodium Pentothal solution through the attached three-way stopcock. When a tolerance for, or rather an absence of sensitivity to, pentothal is established, the injection is continued at the rate of 3 - 4 cc per minute until reflexes are abolished and the jaw is sufficiently relaxed to permit the introduction of the laryngoscope. The nasopharynx and the trachea are cleansed of secretions with the suction, sprayed with pontocaine solution and the endotracheal tube gently introduced into the trachea.

Oxygen is then administered through the tube to ascertain that there has been a true intubation and that there is a dry airway. The use of an endotracheal cuff is not felt to be necessary. A bite block is taped to the endotracheal tube and a 50-50 mixture of nitrous oxide and oxygen administered. Sufficient anesthesia for most of the neurosurgical procedures encountered is thus maintained with only occasional small additional doses of 2 - 3 cc of pentothal whenever reflexes become evident.

Blood pressure, pulse and respiration are checked and recorded at intervals of 3 to 5 minutes throughout the operation. Blood is administered during the operative procedure as indicated by blood pressure fluctuations or by the level of hemoglobin and red blood cells. It has been noted that a more constant and better sustained blood pressure is maintained if the operating table is kept level rather than having the head of the table elevated as has been practiced elsewhere.

When closure of the operative incision is begun, the administration of pentothal is discontinued altogether.

er, sufficient anesthesia being maintained by the nitrous oxide and oxygen alone. When closure is completed, nitrous is stopped and pure oxygen administered until the dressing is applied. The endotracheal tube is then removed, care being taken to cleanse the trachea of secretions with a suction tube through the

endotube, and an oral airway inserted. The patient is returned to the ward where he is placed in the coma position as described in other articles in this issue for immediate post-anesthetic care.*

* The Management of Penetrating Craniocerebral Trauma.

TREATMENT OF CLOSED HEAD INJURIES

Lt. Colonel Arnold M. Meirowsky, MC, Neurosurgical Consultant, Far East Command

The expanding intracranial lesions of traumatic origin always require surgical intervention. Conservative management is in order in the case of cerebral concussion or contusion. The ultimate degree of recovery largely depends on the specific care which the patient receives, particularly when the injury is accompanied by a prolonged period of coma. It is nursing care which prevents cerebral anoxia, asphyxia, aspiration pneumonia, and all the other complications to which the comatose patient so readily succumbs. Planned guidance and strictest supervision of that nursing care are the foremost responsibilities of the physician and surgeon who manages the treatment of patients with trauma to the head.

A practical classification of the closed head injuries (Table 1) includes cerebral concussion, cerebral contusion, extradural arterial hemorrhage, extradural venous hematoma, subdural venous hematoma of the simple or mixed variety, subdural hydroma, subarachnoid hemorrhage and subcortical hematoma. Any one of these conditions may or may not be associated with a linear fracture of the vault, a depressed and comminuted fracture, or with a basilar skull fracture. Associated injury to the cervical spine represents a complication which is commonly unrecognized. The simultaneous occurrence in one patient of two or more of these pathological lesions is not uncommon. A subdural hydroma frequently occurs in the presence of an extensive cerebral contusion. A subdural hydroma, or hematoma, may also underlie a venous extradural hematoma and is readily missed by the surgeon who fails to open the dura after having evacuated the extradural clot.

The majority of patients with closed head injury require conservative treatment. Potentially, however, any patient with such an injury is a suspect for an expanding intracranial lesion. Exploratory burr holes are indicated when unilateral localizing signs develop or when there is a continued increase in the intracranial pressure. The commonly known symptoms of increased intracranial pressure include headaches, nausea, vomiting, restlessness, incontinence, drowsiness, irritationalism, stupor and coma. A careful observation of the vital signs, pulse, respiration, blood pressure, and temperature, usually reveals increasing intracranial pressure in its early stages. As long as the intracranial pressure is compensated for by the systemic circulation one can readily observe a slowing of the pulse rate, a rise of systolic blood pressure, a rise in pulse pressure, and slowing as well as irregularity of the respiratory rate. Once the systemic circulation can no longer compensate for the increased intracranial tension, the state of decompensation manifests itself by a reversal of the vital signs. The pulse rate becomes rapid, the blood pressure drops, and the respiratory rate becomes exceedingly rapid and irregular. In the state of decompensation surgical decompression is no longer effective. It is therefore mandatory that increased intra-

cranial pressure be recognized while it is still compensated for by the systemic circulation.

CEREBRAL CONCUSSION:

The clinical syndrome generally referred to as cerebral concussion consists of a period of unconsciousness of varying duration, subsequent temporary mental confusion and headaches. Except for a depression of reflex activity there are usually no pathological findings on neurological examination. Gross anatomical changes cannot be demonstrated in experimentally produced concussion. Walker's concept of the physiological basis of concussion as "the result of intense excitation of the central nervous system at the moment of the blow to the head" is not generally accepted. Conservative management and early ambulation are the most valuable aids in the treatment of cerebral concussion. It is important to perform repeated neurological examinations in order that a slowly expanding intracranial lesion may not be overlooked.

CEREBRAL CONTUSION:

The syndrome of cerebral contusion includes all those head injuries which are associated with gross pathological changes in the brain. Prolonged coma and increased intracranial pressure are predominant features of cerebral contusion. The neurological findings, of course, vary with the site of damage. The clinical picture of a middle meningeal hemorrhage may be simulated by a contusion of the frontal and temporal lobes. Immediate onset of hemiplegia usually points to contusion rather than massive hemorrhage. This group of cases presents the greatest challenge to the attending physician. In order to make the indications for neurosurgical intervention, the differential diagnosis between expanding intracranial lesion and contusion must be made. It is always better, in doubtful cases, to make bilateral anterior and posterior exploratory burr holes. Unless that is done, a bilateral hematoma with unilateral signs may readily be missed. In the presence of a midbrain syndrome with damage to mesencephalon and brain stem, surgery can offer little, if anything. The management of cerebral contusion without associated depressed fracture and without an additional expanding intracranial lesion must be conservative. Subtemporal decompressions which have been used in the past have long proved to be worthless procedures unless they are used in some isolated cases of specific nature.

EXTRADURAL ARTERIAL HEMORRHAGE:

The case of a 23-year old Navy lieutenant might serve to illustrate the typical syndrome of an extradural arterial hemorrhage as produced by rupture of the middle meningeal artery. Five hours prior to arrival at a Field Hospital on a Pacific Island this patient

was struck in the left temple by a soft ball. He was momentarily unconscious. After a lucid interval of thirty minutes he went into semicoma. On arrival at the Field Hospital he did not respond to pain stimuli but was exceedingly restless. Palpation of the skull did not reveal any fracture (x-ray studies were omitted because of the extreme surgical emergency, but a fracture was not demonstrated at time of operation and was not noted on the postoperative skull films).

Left pupil was dilated and fixed. There was a facial paralysis on the right of central type. There was spastic paralysis of the right upper and lower extremities with hyperactive deep tendon reflexes on the right, pathological toe signs on the right and sustained cloni. There was moderate nuchal rigidity. Immediate operation revealed a massive left middle meningeal hemorrhage which was evacuated. The left middle meningeal artery was ligated at its exit from the foramen spinosum. The patient made an uneventful recovery. A three year follow up failed to reveal any neurological sequelae.

EXTRADURAL VENOUS HEMATOMA:

The case of a 20-year old Marine sergeant (H.G.) not only represents the rather rare picture of an extradural venous hematoma associated with a subdural hematoma, but is also instructive because of a commonly encountered surgical complication. During the Okinawa campaign, this patient was admitted to the minor surgical section of an advanced Field Hospital because of a tangential bullet wound which had caused a superficial scalp laceration over the left forehead, but had not rendered the patient unconscious. The scalp laceration was not debrided but simply dusted with sulfa powder and pulled together with an adhesive strip. Twenty-four hours later the patient started to vomit, complained of severe headache, and became increasingly drowsy. We were first called to see him the following day when he appeared extremely drowsy, but could be aroused from his stupor. He understood questions, but answered them hesitantly and with incorrect and slurred pronunciation. The scalp laceration in the left frontal area was grossly infected. The left pupil was dilated. There was bilateral papilledema. There was a right facial weakness of central type. The right arm was paralyzed; the right leg showed marked motor weakness. Cutaneous sensory perception was diminished on the right. There was astereognosis on the right. The deep tendon reflexes were diminished on the right and the Babinski sign was present bilaterally. The patient had moderate nuchal rigidity. The operation was complicated by the grossly infected scalp laceration, and the case is a good example of the importance of early surgical debridement and closure of every scalp laceration. By use of a flap placed far posteriorly to the infected laceration, a huge extradural venous hematoma which was overlying the entire left hemisphere was evacuated. A moderately large subdural hematoma was likewise evacuated. The craniotomy wound healed in four days. The scalp laceration healed in four weeks. The patient then made an uneventful recovery and was found to be without neurological sequelae on a three year follow up.

SUBDURAL HEMATOMA AND HYDROMA:

Early neurosurgical intervention is mandatory in all these cases. The differential diagnosis between a cerebral contusion and an expanding intracranial hematoma cannot always be made immediately. Repeated neurological examinations, a continued check of the vital signs, and close observation of the changing

degree of consciousness will lead to early recognition of a surgical intracranial lesion. Bilateral anterior and posterior burr holes were the operative method of choice. Occasionally, it may be necessary to turn a flap so as to accomplish complete evaluation of the hematoma and to stop active bleeding.

It is commonly accepted today that morphine is contraindicated in the treatment of patients with trauma to the head, not only because morphine raises the increased intracranial pressure and depresses respiration, but it also masks neurological changes and alterations in the state of consciousness. Unfortunately, it is not generally accepted that the latter applies to all sedatives, the masking effect of which may make it impossible to time properly the indications for surgical intervention. Restlessness which, unless due to a distended bladder, is always a sign of increased intracranial pressure in these patients must serve as a warning signal to the surgeon. The sedative may readily conceal such changes in the patient's condition which could lead to the recognition of an expanding intracranial hematoma. For that reason one cannot warn strongly enough against the use of sedatives in patients with trauma to the head.

One word should be said here about the indications for diagnostic lumbar punctures. We are all aware of the dangers of releasing cerebrospinal fluid by the spinal route in the presence of increased intracranial pressure. Herniation of the cerebellar tonsils through the foramen magnum is not an uncommon sequel of that procedure. The proponents of diagnostic lumbar punctures feel that measurement of the intracranial tension by use of a needle with narrow gauge is safe as long as no other fluid is removed than that in the manometer. What then is the advantage of a diagnostic lumbar puncture? In the presence of a severe head injury there is usually sufficient clinical evidence to establish the diagnosis of increased intracranial pressure. Bradycardia, hypertension, restlessness, incontinence, drowsiness, and the commonly known neurological changes will readily reveal the presence of increased intracranial pressure. The only other information which a lumbar puncture can yield is from the appearance of the cerebrospinal fluid. The presence or absence in the fluid of red cells does not aid us in the differentiation of a subdural hematoma or hydroma from a cerebral contusion. The simple subdural hematoma without tear in the arachnoid will yield clear fluid. In the mixed subdural hematoma blood will leak into the subarachnoid space and produce xanthochromic fluid, a finding which is also common in the presence of cerebral contusion. It seems then that little if anything can be gained from a diagnostic lumbar puncture in cases of closed trauma to the head. It is our practice to reserve that procedure for a few selected cases of mild injuries in which the clinical findings fail to reveal definite evidence of increased intracranial pressure or true cerebral damage. The so-called "therapeutic" lumbar puncture with repeated drainage of cerebrospinal fluid is hazardous, illogical, and cannot be condemned strongly enough.

SUBARACHNOID HEMORRHAGE, SUBCORTICAL HEMATOMA:

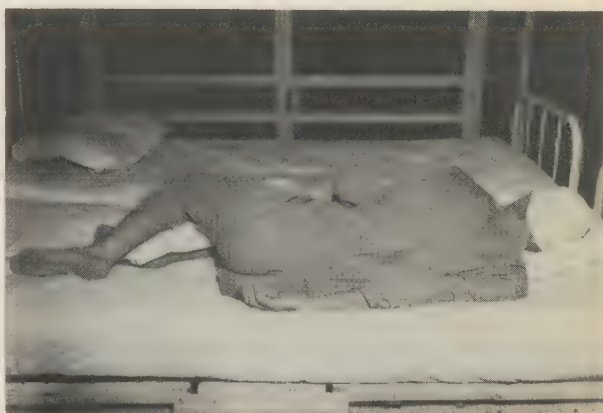
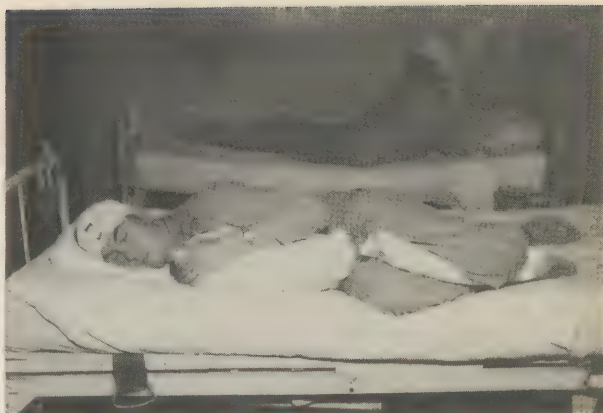
Not infrequently subarachnoid hemorrhage may have a traumatic etiology and may be associated with a subcortical hematoma, a condition which occasionally responds favorably to surgical intervention.

The case of N.C., a white Army corporal, represents this very condition. A few days prior to admission to the neurosurgical section of an overseas General

Hospital, the patient had kept to himself, slept a great deal, and did not talk much. Occasionally he aroused and complained of severe headache. No history of injury was obtained. Several weeks postoperatively the patient suddenly remembered that he had been struck on the head by a crane four days prior to the onset of his headaches. On admission the patient was comatose and had severe nuchal rigidity. There was no external evidence of injury. X-ray studies did not demonstrate a skull fracture. The patient had bilateral papilledema and a right sided hemiplegia. The diagnosis of subarachnoid hemorrhage with a left frontal subcortical hematoma was made. A left frontal craniotomy was performed and an extensive subcortical hematoma evacuated by aspiration. The patient was returned to the States six weeks later after having regained his speech and after having recovered from the hemiplegia.

There can be no doubt that surgical intervention is the method of choice in those instances of subarachnoid hemorrhage which are associated with localizing signs indicating the presence of a subcortical hematoma.

The value of special and exacting nursing care in head injury has already been stressed. Proper positioning of the comatose patient is of vital importance. Lying flat on his back with the head hyperextended, the patient in coma may readily drown in his own fluid. Cyanosis with subsequent asphyxia and aspiration pneumonia cannot be prevented successfully in that position. Pronounced cerebral edema invariably develops when the air passages are obstructed, not because of the actual brain damage but because of the generalized anoxia. The coma position has been an invaluable aid in the management of the unconscious patient. This position consists of placing the patient on his side with hips and knees flexed, the dependent arm behind the back, the chest supported by a pillow, and the head slightly ante-flexed but aligned with the spine. So positioned, mucus and vomitus cannot be aspirated into the bronchial tree. In order to oxygenate each lung to an equal extent, patient must be turned from right to left coma position as often as every two hours. By frequent use of the nasal suction, free air passages can always be maintained in the coma position. The questionable advantages of dehydration by fluid restriction or intravenous administration of hypertonic solutions are outweighed by the maintenance of a normal status of hydration. Tube feeding must be instituted early. Frequent eye irrigations, special skin care, and bladder and bowel care must be routine in the management of the comatose patient. Spontaneous



bowel movements must be prevented because the straining invariably causes a rise in the intracranial tension and may lead to secondary intracranial hemorrhage. The patient must be aroused at regular intervals so as to detect changes in his level of consciousness. Frequent check of the vital signs, as has already been pointed out, often reveals a sudden increase of the intracranial pressure. Bed nets have been a helpful protective measure in the care of these patients.

Carefully integrated surgical and conservative management of the patient with trauma to the head has brought about cure of many desperate cases. The words "too late" should never be used until pulse and respiration have ceased to function.

TREATMENT OF PENETRATING WOUNDS OF THE SPINAL CORD

Lt. Colonel Arnold M. Meirowsky, MC, Neurosurgical Consultant, FEC

Trauma to the spinal cord, or to the cauda equina, may result in complete permanent paralysis below the level of injury; it may result in initially complete paralysis with gradual return of all, or of some of function, or it may result in partial paralysis with continued gain in functional return. A prognosis as to the latter cannot be made before operation; it cannot always be made with certainty after the cord has been inspected.

It is an established fact that the life expectancy of a properly treated paraplegia patient is as good as that of the average individual. The ultimate

goal of surgical, medical and nursing treatment of a paraplegic disorder is REHABILITATION. There are today a great many World War II Veterans who, though permanently paraplegic, perform well at a steady job, live a satisfactory family life, and are valuable members of society. They have reached the goal of rehabilitation toward which our neurosurgical efforts must be directed in every instance of paraplegia.

Trauma to the spinal cord does not manifest itself solely by the pathological changes which are visible in and about the cord at the site of injury. Such

trauma affects the entire physiology of the body. It may interfere with motion and with sensation, with the function of bladder, of bowels and of other visceral organs, with the circulatory system, with the sweat apparatus, with the endocrine system and with the electrolyte balance. The management of penetrating wounds of the spinal canal and of its contents is therefore equally concerned with the local pathology as with the effect which this pathology may have on distant organs and physiological mechanisms. Last, and not least, he who cares for casualties with trauma to the spinal cord must take into consideration the grave mental anguish which the conscious experience of sudden motor and sensory loss may cause.

The task which awaits those of us who are charged with the care of casualties with injury to the spinal cord, in the combat zone as well as in the zone of communication, presents a genuine challenge. From the battalion aid station on down the line to the neurosurgical team in the combat zone, definite responsibilities must be assumed by doctors, corpsmen, ambulance drivers and air force personnel in charge of evacuation. Ultimately, only the combined efforts of neurosurgeon, general surgeon, urologist, thoracic surgeon, orthopedic surgeon, internist, physiotherapist and nurse will suffice to meet that challenge and will serve to pave the way for complete rehabilitation.

The Surgeon of the Far East Command provides two echelons for the special care of casualties with trauma to the spinal cord: the First Neurosurgical Detachment which is attached to the 121st Evacuation Hospital, APO 301, and the Neurosurgical Center at the Tokyo Army Hospital, APO 1052. Every effort is being made on the part of forward medical installations to evacuate these casualties without delay to the Neurosurgical Detachment. Subsequent to laminectomy, patients are flown from there to the center in Tokyo. Associated injuries, particularly perforating wounds of abdominal viscera or penetrating wounds of the chest, may delay evacuation to the neurosurgical team. In order to prevent in these cases such complications as overdistention of the bladder, infection of the G. U. tract, decubital ulcers, and infection at the site of entrance of the missile wound, these medical and nursing measures must be adhered to which are basic in the management of any paraplegia disorder.

I. General Measures

1. Position. The position of a patient with a penetrating wound of the spinal cord should be prone or supine. Rather than bedding the paraplegic or quadriplegic patient on a cot, he is best cared for on a litter which has been padded amply with blankets. In the presence of trauma to the cervical cord, the head may be immobilized between sandbags or blanket rolls. Immobilization by cast is contraindicated because of absent skin sensation and because of the disturbed sweat mechanism. So as to prevent the development of decubital ulcers, the patient must be turned not less often than every two hours. An easy method of turning a paraplegic or quadriplegic patient who is bedded on a litter consists of placing a second padded litter on top of the patient and turning him between the two litters which have been strapped together. The positioning, the turning and the nursing of paraplegic and quadriplegic patients is facilitated greatly by the use of Stryker frames. Whenever available, the frame is used in lieu of the padded litter; it

is covered with soft pillows rather than with a mattress. Padding should be used between the inner surfaces of ankles and knees. In the supine position, the lowermost pillow should end at the level of the ankle, allowing the heel to hang freely. The use of the standard foot board will serve to prevent maintained plantar flexion. In the prone position, the lower pillow and canvas frame should end just above the ankle allowing the feet to hang down perpendicular to the floor.

2. Transportation. The safest method of transporting casualties with penetrating wounds of the spinal cord consists of litter transport in the supine position. Care must be taken that the transport litter is well padded by blankets.

3. Wound Care. Debridement of the site of penetration may be deferred if it is certain that the patient will reach the neurosurgical team within twelve to twenty-four hours. Otherwise, surgical debridement of the wound in accordance with general surgical principles is indicated. A large, gaping wound does not present a contraindication to laminectomy. Delayed evacuation because of such a wound is not warranted. Debridement can be carried out at time of neurosurgical intervention providing laminectomy is performed early.

4. X-ray. Roentgenological studies should include AP and lateral views of the involved area of the spinal column so as to determine the extent of the bony damage and the position of the missile. So as to speed up evacuation, x-ray studies should not be performed before the patient is admitted to the Neurosurgical Detachment. Chest films are taken routinely on all patients with injury to the thoracic spine.

5. Bladder Care. Urinary retention with overflow exists in the majority of patients with injury to the spinal cord. The ultimate establishment of a reflexly, or of an automatically, functioning bladder depends on the efficacy of the early management of the neurogenic bladder. Overdistention of the bladder must be avoided. Bladder tone should be maintained. Infection of bladder and ascending G. U. tracts must be prevented.

Without exception, a No. 16 French Foley (or if this type is unavailable, a soft catheter of the same size or smaller) should be inserted under sterile precautions at the first medical installation to which the patient is admitted. Hand irrigations twice daily will serve to keep the catheter patent and to prevent infection. The catheter has to be changed at regular intervals. It is not to be removed until repeated tests show that the residual urine amounts to less than 30 cc.

Munro's Tidal Drainage represents the treatment of choice of the neurogenic bladder. It should be substituted for straight catheter drainage at the earliest feasible time. Only in the presence of urinary infection may it be necessary to discontinue the tidal drainage temporarily and to use straight drainage in lieu of it.

Suprapubic cystostomy as a method of treatment of the uncomplicated neurogenic bladder is contraindicated. Even its temporary use interferes considerably with the restoration of a functioning reflex bladder. It makes it virtually impossible to produce bladder automaticity surgically in the chronic stage of paraplegia.

6. Bowel Care. An enema should be given at the earliest possible time after injury providing the patient is not in surgical shock because of associated injury. Enemas should be repeated every other day. Fecal impactions occur commonly in the presence of a paraplegic disorder. Rectal examinations must therefore be done frequently and at regular intervals. Fecal impactions should be relieved promptly. Intestinal distention also requires prompt attention and can best be corrected by enema, rectal tube, or occasional use of prostigmine.

7. Fluid Maintenance. A minimum fluid intake of 4000 cc is indicated in every uncomplicated case of spinal cord injury. In the event that this fluid should be administered intravenously, saline should not be used in excess of 1000 cc of the twenty-four hour total. An accurate record of the twenty-four hour total intake and output provides the only means to maintain a proper fluid balance.

8. Blood. Early after cord injury, an abnormal blood picture develops almost invariably. This is characterized by a sharp drop in serum proteins, followed by reduction of hemoglobin and by a decrease in red cells. Poorly cared for paraplegic patients with decubital ulcers and with bladder infection may reach a serum protein level below 5.0 gm, a hemoglobin level below 10 gm and may show a reversal of the albumin-globulin ratio. If decubiti are not present at this time, they are most likely to develop. Prevention of these changes in the blood picture constitutes one of the most important aspects of the entire treatment of a paraplegic disorder. Maintained anemia and hypoproteinemia may readily set off a vicious cycle which leads ultimately to cachexia and death. To prevent these common changes in the blood, whole blood should be administered whenever the hemoglobin is below 14 gm and whenever the red cell count is lower than 4,000,000. It is generally calculated that one pint of whole blood should be given for every 0.5 gm that the hemoglobin is found below 14 gm. The intravenous administration of plasma, serum, or of protein digests does not suffice to combat the changes in the blood; their administration is not warranted. Whole blood is the treatment of choice.

9. Skin Care. The skin does not tolerate long periods of pressure with concomitant ischemia. Turning of the paraplegic patient every two hours constitutes the most important part of the care of his skin. Hypoproteinemia must be prevented. It is also of the utmost importance that the skin be kept clean and dry at all times. The perineal areas are frequently neglected and should be checked regularly.

The treatment of decubital ulcers consists of their prevention.

10. Antibiotics, Chemotherapy. During the first two weeks after injury, 600,000 units of Penicillin and 0.5 gm Streptomycin are administered intramuscularly twice a day. In the presence of infection, the respective antibiotics are given in accordance with the sensitivity studies. The use of sulfa drugs in the field is contraindicated, particularly in view of the involvement of the G. U. tract.

11. Sedatives, Analgesics. The use of habit-forming drugs is contraindicated in the presence

of a paraplegic disorder. Invariably, these patients will have to undergo prolonged hospitalization. Until they are convinced of their potential rehabilitation, until they have overcome the grave mental shock which is concomitant with sudden trauma to the spinal cord, they are quite prone to succumb to the tragic danger of addiction. Every effort must be made from the first to prevent the patient from becoming exposed to addiction which is incurable.

In high cervical cord injury, the use of morphine is also contraindicated because of the proximity of the respiratory center in the medulla.

Not infrequently, anatomical or physiological transection of the cervical cord is responsible for a disorientation syndrome which might be associated with severe bradycardia and other signs of excessive vagal activity. In the absence of concomitant head injury, it seems possible that afferent sympathetic impulses may act in an unbalanced fashion on the frontal lobes (areas 13 and 14), bringing about a state of mental confusion (W. F. Freeman). Rather than sedating a patient presenting this syndrome, atropine might be used successfully.

12. Pressor Phenomena. The pressor phenomena occur rarely in the acute stage but are not at all uncommon in the subacute and chronic stage of paraplegia and quadriplegia. They consist of paroxysmal headaches, paroxysmal hypertension, profuse sweating above the level of the lesion, and occasionally of associated generalized seizures. Though still ill understood, these phenomena, not uncommonly, are elicited by overdistention, or by irritation, of the bladder, and can then be reversed instantaneously by adequate bladder drainage.

II. Neurosurgical Measures

Penetrating wounds of the spinal cord constitute a neurosurgical emergency. Surgical shock, unless caused by associated injury, or by blood loss from a large gaping wound of the soft tissue of the back, does not present a pertinent feature of these injuries. If present, the treatment of surgical shock must have precedence. Complicating perforating wounds of the abdomen, or of the chest, which are life endangering also must receive attention prior to neurosurgical intervention.

Earliest feasible laminectomy is indicated in each case of a penetrating wound of the spinal cord. The debridement of the entrance wound and, if present, of the exit wound, the removal of all comminuted and potentially infected laminar fragments, and the evacuation of clots and debris remain the most efficacious safeguard against infection. It is the combination of early surgical debridement and administration of antibiotics which has served to reduce, in these cases, infection to a minimum. An equally important aim of a decompressive laminectomy is restoration and/or preservation of function.

1. Penetrating Wounds of the Cervical Cord. Return of function cannot be obtained below the dermatome level in the presence of an anatomical or physiological transection. Decompressive laminectomy in these cases, however, may restore the function of individual cervical roots above the area of transection. This is of particular impor-

tance if the affected roots supply individual muscles of fingers, hands or arms. Decompression of cervical roots is essential for the relief of root pain. Surgical cleansing of the extradural, subdural, and subarachnoidal space aids in the prevention of an ascending paralysis. Mild contusion of the cord, not infrequently, can be reversed by surgical decompression.

2. Penetrating Wounds of the Thoracic Cord.

In the presence of a partial paralysis, decompressive laminectomy prevents further damage to the spinal cord, and may serve to restore function. Clinical examination does not reveal with definiteness the irreversibility of a thoracic cord lesion. The gain from decompression of individual thoracic roots is negligible.

3. Penetrating Wounds of the Conus Medullaris.

As far as restoration of function is concerned, as result of neurosurgical intervention, the same principles apply which have been discussed for the penetrating wounds of the cervical cord.

4. Penetrating Wounds of the Cauda Equina.

Compression of the cauda equina by depressed and comminuted bone fragments is benefited considerably by laminectomy and neurolysis. Even in the presence of a partial transection of the cauda, individual roots may be restored to function. Root pain which is common in cauda equina lesions may be ameliorated by surgical decompression. Our experiences with

late cauda equina lesions, however, lead us to believe that many of the patients in this group ultimately require relief by chordotomy so as to prevent agony and addiction. Bilateral section of the lateral spinothalamic tracts at a high thoracic level should therefore be considered early in the presence of root pain consequent to anatomical transection of the cauda equina.

It is of the utmost importance that the patient is fully oriented as to the extent of his injury. Early knowledge of all facts involved and of the tremendous potential of rehabilitation, even in the presence of an anatomical transection, facilitates adjustment. It prevents the bitterness that stems from the hope for something that cannot be had; it also permits a man afflicted with permanent paraplegia to direct his thoughts and actions toward the goal of rehabilitation which he can reach as long as he has the wholehearted support of his doctors and of his nurses.

Those who are particularly interested in the treatment of paraplegia, will find valuable information in the paper by L. W. Freeman TREATMENT OF PARAPLEGIA RESULTING FROM TRAUMA TO THE SPINAL CORD, JAMA 140: 949-958, July 16, 1949 and 140: 1015-1022, July 23, 1949.

ANESTHESIA

Major Harry P. Makel, MC, Chief, Anesthesia and Operations Section, Tokyo Army Hospital

The anesthetic management of a patient begins in the pre-operative period. At this time many factors which may influence the choice of anesthetic agent and technique can be considered and evaluated. The more important factors to be considered are:

I. The general condition of the patient: Is the patient in good physical condition or is he suffering from malnutrition, dehydration, exposure, etc.? If these conditions are found to be present they should be corrected pre-operatively or treated rigorously during surgery if operation cannot be delayed.

Patients suffering from dehydration and malnutrition tolerate anesthesia and surgery poorly, and shock is often produced by minimal trauma in these patients. This group of patients require much less anesthesia than those in good general condition.

II. The presence or absence of shock: Shocked patients also require minimal amounts of anesthetic drugs to achieve satisfactory operating conditions. A method of anesthesia which provides good control of the level of anesthesia, reduces the loss of body heat and moisture to a minimum and provides a high concentration of oxygen in the inspired atmosphere is necessary in the shocked patient. Ether-oxygen anesthesia administered by the closed system technique best satisfies these conditions.

III. Presence of undigested food in the stomach: The presence of food in the stomach along with gastric distention is not infrequently encountered in patients who have suffered a severe injury.

Ideally, all wounded patients should have their stomachs emptied prior to the induction of anesthesia in order to prevent aspiration of gastric contents. An additional reason is that gastric distention is great enough in some patients to interfere with circulation and respiration. It is especially urgent in patients who have taken food or fluids as recently as three hours or so prior to injury or at any time since injury.

The most effective method for emptying the stomach is to pass into the stomach the largest possible gastric tube. By judicious manipulation of this tube in the posterior pharynx as it is passed, vomiting can readily be induced. This removes the large particles which could not be washed out through the tube. Actual washing of the stomach is to be avoided in patients where injury to the stomach or esophagus is suspected. In non-emergency cases oral intake of food and fluid should be stopped six to eight hours prior to the induction of anesthesia.

IV. Presence of acute respiratory disease: Inhalation anesthesia, by irritating agents such as ether, is best avoided if possible in these cases and if of necessity employed, should be administered using an endotracheal tube in order to insure a patent airway and provide a means for the removal of the excessive secretions which often accompany these pulmonary conditions.

V. Extent and location of the wound and the contemplated procedure: From the location and extent of the wound it can usually be readily determined

whether or not the operation necessary will be prolonged or shocking. If a long, shocking operation is anticipated, spinal, regional and intravenous anesthesia are best avoided in favor of inhalation anesthesia.

Knowledge of the procedure to be carried out will also aid the anesthetist in choosing his method of administration of the anesthetic. Certain types of cases where general anesthesia is required indicate the use of an endotracheal tube. These are: intracranial, maxillo-facial, thoracic (pleural involvement) and abdominal cases, any case where the position of the patient makes it difficult to maintain an airway, and in cases lasting over an hour.

Endotracheal anesthesia not only insures a patent airway, but it also serves the very important purpose of freeing the hands of the anesthetist, thus facilitating his management of fluid therapy, etc.

Premedication

Premedication has a threefold purpose: It alleviates the patient's apprehension concerning the operative procedure; reduces the dose of anesthetic agent necessary by a depression of the patient's metabolic demands; and depresses the activity of the parasympathetic nervous system, thus preventing certain untoward reactions.

A satisfactory system of premedication should include a short-acting barbiturate the night before surgery followed by a barbiturate two hours before induction of anesthesia, and an opiate plus a drug of the belladonna group from 45 minutes to one hour prior to induction of anesthesia. Nembutal gr. $1\frac{1}{2}$ and morphine sulphate gr. $1/6$ plus atropine or scopolamine gr. $1/150$ are the doses usually required by an adult male in good general condition.

In emergency cases where less than an hour is available prior to surgery, it is best to administer the morphine and atropine intravenously 15 to 20 minutes before beginning the anesthesia.

The use of atropine is important as it reduces the amount of secretion which may prove troublesome, especially during ether anesthesia, and it also minimizes vagal reflexes which are responsible for such complications as laryngospasm, which is especially prone to occur during pentothal anesthesia.

The presence of shock modifies the requirements for premedication. The use of morphine is best avoided in shocked patients unless needed to control severe pain. The routine use of morphine in shock patients may result in sudden absorption of the drug from subcutaneous deposits when peripheral vasodilation due either to ether anesthesia or fluid replacement therapy occurs. This may lead to a severely depressed state in these already critical patients.

When administered to a shocked patient, morphine is best given intravenously in small dosage ($1/6$ gr.) and repeated if necessary. In the majority of cases where shock is a complicating factor, atropine alone or in combination with a barbiturate, if needed for the control of excessive restlessness, is sufficient.

Inhalation Anesthesia

Ethyl Chloride and Chloroform: With the anesthetic agents now available, there is little excuse for

the use of either of these drugs. The effects of these drugs is such that there is even less excuse for their use in wounded men than in non-traumatic cases such as encountered in civilian practice, where their use has been discredited for many years.

Nitrous Oxide: Nitrous oxide has limited usefulness due to its lack of potency when used in non-hypoxic concentration. Its main uses are for induction of ether anesthesia or as a supplemental agent to add to the effect of sodium pentothal. Nitrous oxide should always be administered with at least 20% oxygen and in a semi-closed system utilizing a high flow of gases—at least 3 liters per minute. It has some use for minor surgical procedures such as change of dressings, etc.

Ether: Ether is the drug which satisfies more of the requirements of the patient and surgeon than any of the inhalation agents. It is the anesthetic of choice in the seriously wounded patient and in patients in shock or in whom shock is impending.

The main disadvantages of ether are its irritating effects upon the respiratory tract, the high incidence of post-anesthetic nausea and vomiting and its inflammability. Its advantages far outweigh its disadvantages, however.

Ether is most effectively administered using the closed carbon-dioxide absorption anesthetic apparatus, but can be satisfactorily employed using the open or semi-open technique. It has the widest margin of safety of all the anesthetic agents and is the safest agent for use by inexperienced personnel.

Intravenous Anesthesia

Sodium Pentothal: Sodium Pentothal has several very desirable qualities which tend to lead to its use in cases where it is contraindicated. It requires very little equipment to administer, a smooth rapid induction of anesthesia is attained even by inexperienced personnel and there is usually a prompt awakening of the patient and a low incidence of unpleasant after effects such as nausea, vomiting, etc. However, these factors must not be permitted to outweigh the fact that the use of sodium pentothal is incompatible with certain types of injuries and operations, and that the fatal dose varies extremely widely from one patient to another.

Indications for use of sodium pentothal:

1. Operations where muscular relaxation is not necessary and where large loss of blood is not anticipated in men in good condition.
2. As an aid in the induction of inhalation anesthesia.
3. As a supplement to regional and spinal anesthesia to obviate the patient's apprehension and to eliminate discomfort due to traction reflexes during abdominal surgery, etc.
4. In certain types of face and jaw injuries where the absence of post-operative nausea and vomiting is essential or where the cautery is to be used about the head and neck.

Here it is imperative to perform endotracheal intubation to assure a patent airway and remove the anesthetic apparatus from the surgical field. Topical anesthesia of the airway (cocaine 4 to 10%, or

2% pontocaine) accomplished either by spraying or by transtracheal injection or the use of a curare preparation facilitates the introduction of the endotracheal tube in these cases. In any case, when it is not possible to introduce an endotracheal tube, tracheotomy must be performed (under local anesthesia) prior to the administration of pentothal.

5. Sodium pentothal may be used in conjunction with nitrous oxide-oxygen and curariform drugs for abdominal or thoracic surgical procedures. This, while satisfactory in elective surgical procedures, is a poor choice in freshly wounded men and is contraindicated in shock.

Sodium pentothal is best administered by the fractional method using a 2.5% solution. Oxygen should always be administered during the use of pentothal and nitrous oxide-oxygen (50--50%) if available to reduce the dose of pentothal.

Contraindications:

1. Shock or impending shock. Pentothal is a depressant to both respiration and circulation.
2. Severe depression from other drugs such as morphine.
3. Cases where muscular relaxation is necessary (cannot be attained with safe doses of pentothal).
4. Prolonged operations (over one to one and a half hours). Pentothal has a cumulative action and prolonged post-operative depression may result.
5. The presence of cervical infection. Sudden death may result due to sensitization of the carotid sinus reflexes. If pentothal must be used, as in certain cases of compound fracture of the face, employ the following precautionary measures:

- (a) Heavy pre-operative atropinization (gr. 1/100 one hour prior to anesthesia and gr. 1/200 intravenously just prior to start of the anesthesia).
- (b) No surgery allowed started until at least ten minutes following induction of anesthesia.
- (c) Avoid pressure on carotid sinuses and block them with local anesthesia if possible.

Positions where it may be difficult to maintain an airway or give artificial respiration such as face down, etc., constitute a relative contraindication to the use of pentothal anesthesia unless endotracheal intubation is performed.

Local and Regional Block Anesthesia

Local and regional anesthesia is of limited value in war wounded due to the frequent occurrence of multiple wounds. However, when it can be successfully employed it is the safest method of obtaining anesthesia.

Procaine in 1 or 2% strength is the best and least toxic drug available for local and regional anesthesia. Using procaine with epinephrine added in a strength of 1:200,000, approximately one hour of anesthesia can be obtained. If prolonged local or regional anesthesia is desired, the use of a 0.15% pontocaine solution with epinephrine 1:200,000 added will give very satisfactory anesthesia of 3 to 6 hours duration.

A barbiturate should be administered prior to employing local or regional anesthesia to protect

against the toxic effects of these drugs.

Regional procedures of value are:

1. Brachial plexus block - for procedures of the head and upper extremity below the shoulder.
2. Paravertebral or intercostal block - for minor procedures on the thorax or abdomen, and to help control post-operative pain from thoracic and upper abdominal incisions thus encouraging coughing.
3. Caudal block - for ano-rectal and perineal procedures.
4. Lumbar sympathectomy and stellate ganglion blocks - for diagnosis and therapy in such conditions as causalgia, acute thrombophlebitis and vascular insufficiency due to or aggravated by vasospasm.
5. Block of cranial nerves, i.e., branches of trigeminal such as supraorbital, infraorbital, mental and lingual nerves, etc. - for procedures on face and neck (combined with cervical plexus block) where general anesthesia is inadvisable.
6. Block of sciatic, femoral and lateral femoral cutaneous nerves for limited procedures on the lower extremity.
7. Peritoneal block is of aid occasionally to aid abdominal relaxation when patient is of necessity being carried in a light plane of anesthesia.

Spinal Anesthesia

Spinal anesthesia is contraindicated in shock and is a poor choice in freshly wounded men due to the precarious state of the circulation. Its use in the forward areas should be restricted to the occasional elective care that arises such as an emergency appendectomy, etc.

Spinal anesthesia is of considerable value in the rear areas where the patients are not newly wounded and are better stabilized. For operations on the lower extremity, lower abdomen and ano-rectal region which are not associated with shocking trauma or excessive blood loss, spinal anesthesia provides an excellent working condition for the surgeon and results in a minimal metabolic disturbance in the patient.

Some of the more common contraindications are:

1. Shock and generalized debility.
2. Infection in region of the puncture site.
3. Disease or damage to central nervous system.
4. Severe hypertension and arteriosclerosis.
5. Anticipation of a prolonged or shocking procedure.
6. Severe bowel obstruction.
7. Surgery above the diaphragm.
8. Emotional instability or uncooperative patient.

Procaine and pontocaine are the most generally available drugs for use in spinal anesthesia. Procaine is best admitted in 5% solution in spinal fluid. Pontocaine is used in 0.5 to 1% solution with either 5% procaine or 10% glucose added if a hyperbaric solution is desired. With procaine 45 minutes to one hour of satisfactory anesthesia can be expected--200 mgm. is considered the top safe dose. Pontocaine will give 1½ to 2 hours of satisfactory anesthesia in most cases--20 mgm. is the maximum dose. When the two drugs are administered together, the dose of each is reduced, i.e., 50 mgm. procaine plus 15 mgm. pontocaine, or 100 mgm. procaine plus 10 mgm. pontocaine (maximum doses under ordinary circumstances).

Curariform Drugs

Intocostrin and d-tubo-curarine chloride are both available. These drugs are not anesthetic agents. They provide muscular relaxation by a peripheral action on the myoneural junction. These drugs are valuable for:

1. Facilitation of endotracheal intubation - paralysis of muscles innervated by cranial nerves occurs first, thus giving good relaxation of jaw muscles and muscles of neck, larynx and pharynx. Also facilitates procedures such as laryngoscopy and bronchoscopy.
2. To obtain good abdominal relaxation in resistant individuals, or where a very light plane of general anesthesia is required due to patient's condition.

Disadvantages: Curariform drugs are paralyzing to the muscles of respiration and often adequate relaxation is obtained only after severe depression of respiration is also present. Thus to administer these drugs a well trained anesthesiologist must be available and adequate equipment for artificial resuscitation of the patient at hand. In abdominal surgery the danger of aspiration is enhanced by the use of curariform drugs and an endotracheal tube, preferably with an inflatable cuff, should be employed to prevent this complication.

Support of the Circulation

1. The treatment of shock is discussed elsewhere and consequently will not be included in this section except to mention that when shock occurs during anesthesia and surgery, the use of vasopressor agents may be of some value. Small intravenous doses of neosynephrine (0.5 to 1.0 mgm.) or ephedrine (25 mgm.) will at times serve to support the circulation temporarily while fluid replacement therapy is being instituted. These drugs are only to be used as a temporary measure and should be employed in conjunction with the other specific measures, namely oxygen therapy and fluid replacement.

Increasing the dosage and excessive repetition is to be avoided as these drugs not only fail to give a satisfactory response in large dosage, but actually act as further depressants to the circulation in large dose.

Another form of therapy useful in shock which has been employed recently is intra-arterial transfusion. This is accomplished by pressure transfusion of blood into an accessible artery such as the radial, femoral, etc. It often results in dramatic improvement when no response is being obtained by intravenous administration.

2. Cardiac arrest occurs occasionally during surgery and anesthesia, and must be treated promptly. Treatment consists of:

(a) Artificial respiration with 100% oxygen, preferably by use of an endotracheal tube and intermittent pressure on the breathing bag of a closed system anesthesia apparatus. Continue until spontaneous respiration of adequate depth and rate return.

(b) Cardiac massage through an opening in the diaphragm or preferably through an intercostal incision. Continue until spontaneous heart beat

returns.

- (c) Rapid transfusion of blood, intra-arterial if possible.
- (d) Use of procaine 1% (5 cc) into heart muscle if found fibrillating, and application of Beck type electrodes if available with use of electrical stimulation.
- (e) Intracardiac administration of 2--3 cc of 1:10,000 epinephrine solution if cardiac standstill is present (contraindicated in presence of fibrillation).

Oxygen Therapy

Purpose: To raise the concentration or percentage of oxygen in the lungs so that the oxygen is "forced" into the blood more readily and on to the tissues, thus contributing to the relief of hypoxia.

Indications: Oxygen therapy is indicated in a wide variety of surgical and medical conditions. Some of the more common are:

1. Injuries affecting the cardio-respiratory system, preventing the normal exchange and transport of oxygen from atmosphere to tissues:
 - (a) Intrathoracic wounds.
 - (b) Intracranial wounds with severe depression of respiration and circulation.
 - (c) Obstruction to respiration due to wounds of upper respiratory passages.
 - (d) Severe abdominal distention.
2. Shock.
3. Diseases of cardio-respiratory system:
 - (a) Pneumonia.
 - (b) Severe asthma.
 - (c) Cardiac failure.
 - (d) Coronary occlusion.
 - (e) Pulmonary embolus, etc.
4. Severe infection:
 - (a) Peritonitis.
 - (b) Anaerobic infection.
 - (c) Massive wound sepsis, etc.
5. Drug poisonings (morphine, barbiturate, etc.)
6. Paralysis of muscles of respiration (polio-myelitis, high spinal cord injuries, etc.).

Methods of Oxygen Administration

1. Oxygen tent. Oxygen concentration varies from 21 to 60% depending on care of administration. Advantages:

1. Comfortable used over long periods of time.
2. Controlled temperature.

Disadvantages:

1. Bulky, expensive equipment, hard to transport and maintain.
2. Nursing care is complicated and interferes with efficient functioning of tent.
3. Technique is more complicated and constant supervision and maintenance is necessary for its efficient use.

4. Claustrophobia occurs in some patients.
5. Impractical to combine with other forms of gas therapy such as helium and carbondioxide.
6. Technically difficult to use for water vapor therapy.
7. Unsatisfactory for use with an irrational patient and for self-administration.
8. 100% oxygen impossible to attain.

II. Nasopharyngeal and oropharyngeal catheter. Concentration from 25 to 60% depending on proper placement of catheter and rate of flow. Advantages:

1. Simple, less expensive equipment.
2. Nursing care is routine and minimal, and does not interfere with the continuous administration of oxygen.
3. Suitable for use in irrational patients.

Disadvantages:

1. Irritation of nose and throat. Must change catheter every twelve hours and keep oxygen well humidified by passing through humidifier jar.
2. Impossible to attain 100% concentration.
3. Impractical for other gas therapy.

Equipment necessary for nasopharyngeal and oropharyngeal oxygen therapy:

1. Source of oxygen (tank).
2. Reducing valve and flow regulator.
3. Humidifier (can use water jar if no other available).
4. Catheter set (two #12 or #14 F soft rubber catheters with numerous small perforations at tip).
5. Catheter adjuster.
6. Vaseline and adhesive tape.

Technique:

1. Attach catheter to apparatus and adjust flow to desired amount.
2. Lubricate catheter with very thin coating of vaseline. Make sure holes are not plugged.
3. For nasopharyngeal oxygen insert the catheter into the nose until resistance indicates the posterior pharyngeal wall has been reached. Then withdraw one-fourth of an inch and strap in place. For oropharyngeal administration, insert the catheter along the floor of the nose and into the pharynx until the patient swallows the oxygen. Withdraw catheter one-half inch and inspect oropharynx. The tip of the catheter should be located at, or just below, the posterior edge of the soft palate. In unconscious individuals where swallowing reflex is gone, inspection alone must be relied on.

Alternate method: Measure on the catheter the distance from the external nares to tragus of ear, subtract one-half inch and insert to this point, confirming by inspection. With oropharyngeal insufflation, the oxygen concentration is raised approximately 4% above room level (21%) by each liter per minute oxygen flow. The maximum concentration is about 60% (8-12 liter flow per minute). Flows below 5 liter per minute are of doubtful value. The values for nasopharyngeal oxygen are about 10% less than those of the oropharyngeal method.

III. Oxygen mask. (35-100% depending on adjustment of oxygen flow). Advantages:

1. Concentrations up to 100% can be readily administered.
2. Self administration is possible.
3. Equipment is relatively simple and easy to employ.
4. Most economical utilization of oxygen.
5. Nursing care is routine and does not interfere with the administration of oxygen.
6. Ideal for administration of other gas therapy (carbondioxide and helium) and water vapor therapy (with use of an efficient humidifier and BLB mask 100% oxygen with a relative humidity of 90% can be administered).

Disadvantages:

1. Face irritation: face care necessary every two hours.
2. Impractical for irrational patients.

Oxygen therapy by mask is the most efficient form of oxygen therapy. Equipment necessary (BLB mask): Same equipment as for catheter method except substitution of mask for catheter. Do not use humidifier unless water vapor therapy is desired. Technique:

1. Start flow of oxygen.
2. Fit mask to patient's face and fasten head strap.

To adjust flow for 100% oxygen, increase liter flow per minute until bag on mask does not quite collapse at the end of inspiration. Concentration of less than 100% can be readily calculated using the liter per minute flow necessary for 100%, i.e., $100\% = 8 \text{ liters per minute} \dots 50\% = \frac{1}{2} \times 8 = 4 \text{ liters per minute}$.

When using the nasal mask on a mouth breather, the concentration of oxygen is equal to that obtained with a corresponding flow through a nasopharyngeal catheter.

Helium gas therapy. Helium is indicated in conditions where respiratory obstruction is present (asthma, upper respiratory obstruction due to edema or trauma). Being a lighter gas, it requires less work to breathe a helium-oxygen mixture than an equivalent amount of air. It is best administered by mask and must always be given in a mixture containing at least 20% oxygen.

Carbondioxide gas therapy. There are very few legitimate indications for the use of this toxic gas. The control of hiccough is perhaps the only acceptable use. 100% oxygen is far superior in the therapy of respiratory depression than the various carbondioxide-oxygen mixtures.

Oxygen therapy in the presence of inadequate respiratory exchange. Some means for artificial respiration must be used in conjunction with the administration of oxygen in these cases. As an emergency measure both the catheter and mask methods can be used in conjunction with one of the manual methods of artificial respiration.

If available, mechanical resuscitators (Krieslman, Drinker, etc.) are satisfactory. If these are not available, the most efficient method is to employ a face mask connected to a breathing bag which can be squeezed manually, thus inflating the lungs with oxygen. The standard closed system anesthesia machine suits this purpose admirably.

Positive pressure oxygen therapy. This form of therapy is desirable in certain conditions such as pulmonary edema or respiratory obstruction. It can be administered either by the use of an anesthesia apparatus where pressure is maintained on the breathing bag and thus transmitted to the lungs or by resuscitators especially designed for this purpose.

Intermittent positive pressure on inspiration is the most desirable type as it avoids the undesirable effects upon circulation which are seen when pressure on both inspiration and expiration is employed. The use of pressures over 14 mm mercury is dangerous due to the possibility of rupture of lung alveoli at higher pressures.

TREATMENT OF EYE INJURIES

Lt. Colonel Forrest E. Hull, MC, Consultant in Ophthalmology, Far East Command

Emergency treatment of severe eye injuries should consist of patching of both eyes, and all eye patients should be evacuated rapidly and directly to the eye center at Tokyo Army Hospital, or to an eye service at Osaka Army Hospital, 382d General Hospital, or 141st General Hospital, whichever is the closest. Patients should arrive at one of the above installations not later than 24 hours after injury. In Korea combat eye casualties should be evacuated to an evacuation hospital or the 4th Field Hospital prior to shipment to Japan.

The following emergency measures should be taken to make eye casualties safe for transportation to the rear.

1. Eyelids should be sutured together in cases where the patient is unable to close his eyes by himself.

2. Prior to evacuation, 300,000 units of penicillin should be administered intramuscularly; and grams 1 of sulfadiazine should be given orally four times daily, each dosage of the latter to be accompanied by 10 grains of soda bicarbonate by mouth. Local instillation of penicillin, 5000 units per cc, and 30% sodium sulfacetamide, 2 drops to the involved eye four times daily, is recommended as local medication. 5% sulfathiazole ophthalmic ointment may be substituted if 30% sodium sulfacetamide is not available.

3. Cases of anterior or posterior uveitis should receive 1% atropine locally to the involved eye prior to evacuation.

4. Cases of corneal ulcers and corneal foreign bodies should receive 1% atropine locally and the involved eye should be patched.

5. Purulent eye infections, such as endophthalmitis, should receive 1% atropine instillations locally. Penicillin and sulfadiazine should be administered systemically. Penicillin and sodium sulfacetamide should be instilled in the involved eye as specified in paragraph 2, above. The eye should be left open, without patching or suturing the eyelids together.

6. The taking of x-rays to localize intraocular or orbital foreign bodies should be deferred until arrival of patient at an eye center. Attempting such localizations under field conditions is a waste of time and x-ray film.

7. Patients with suspected retinal detachment or commotio retinae should receive 1% atropine to the involved eye and should be made an absolute bed patient both prior to and during evacuation.

8. Cases of intraocular foreign bodies should receive 1% atropine locally and systemic administration of antibiotics and sulfonamides in dosages outlined above. The involved eye should be patched.

9. In cases of severe burns around the eyes a bland ointment, such as boric acid, will soothe the eye. If the burn is severe, suturing of the eyelids together may prevent cicatricial ectropion and lagophthalmus.

10. Cases exhibiting fresh blood in the anterior chamber should be evacuated as absolute litter patients and should receive neither mydriatics nor miotics.

More extensive repair of ocular injuries should not be attempted by medical officers not having specialized training in ophthalmic surgery.

TREATMENT OF EAR, NOSE AND THROAT EMERGENCIES

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NOSEBLEED:

Except in penetrating wounds, most epistaxis is due to spontaneous or traumatic rupture of an enlarged vessel in the anterior lower triangle of the nasal septum. This is always easily available to pressure. Nasal packing is applied to the anterior third of the nose on the bleeding side. Absorbent cotton or 1/2" gauze is preferable but clean soft paper may be used in emergency. The nostrils are then pinched against the packing so as to give firm pressure. If this is maintained long enough (5-10 minutes), bleeding is almost always controlled. If bleeding recurs on removal of the packing the next day, a second pack may be left in position 3-6 days without serious diffi-

culty. To avoid danger to the septum, cautery of either the chemical type (silver nitrate) or thermal type should be done only by experienced personnel.

OBSTRUCTION OF AIRWAY: TRACHEOTOMY

No emergency is greater than asphyxia, although shock and hemorrhage rank equally high in danger. Whenever there is any serious question of the adequacy of an airway, procrastination will usually end in sorrow.

Position:

The ideal position is to have the patient supine, slightly in Trendelenburg and with a sandbag or

other support under the shoulder so as to extend the neck.

Anesthesia:

No opiates or other cough suppressants are indicated except to allay severe nervousness. General anesthesia is contraindicated. Local infiltration along the midline with 1% procaine is satisfactory. In severe emergencies, patient is usually in a condition where no anesthesia will be needed or permitted.

Procedure:

Squeeze the thumb and middle finger of the left hand on either side of the trachea to throw it into prominence and fix it in the midline. This pushes back the great vessels well under the sternomastoid muscles. The incision is made clear through the skin from Adam's apple almost down to the sternomastoid notch in one sweep of the scalpel. Bleeding will not be of serious consequence even if the thyroid isthmus is cut. Keeping these fingers in position to maintain the tracheal prominence, the left index finger dissects bluntly and feels down to the tracheal midline. Stay below the 1st tracheal ring if at all possible. Incise through 2-3 rings being careful not to perforate the posterior or tracheal wall into the esophagus. Spread the incision with a tracheal dilator, hemostat, or if necessary, the handle of the scalpel. Insert the cannula. Most adults average a size 5 cannula. Give artificial respiration if respiratory arrest has been present. Oxygen with 5 - 10% CO₂ is insufflated into the opening if available. Temporary hemostasis can be obtained by packing gauze into the wound. Hemostasis may be done in the usual way after respiration is established.

After-care:

Constant nursing for 48-72 hours, as available, with constant suction or wiping away of cough secretions. No opiate or cough suppressants are prescribed. The

most essential portion of post-operative care is the constant cleaning of the inner cannula of tube. This should be cleaned every two hours to prevent obstruction of airway.

If further anesthesia for other surgery is contemplated, do not remove tracheotomy tube even when airway has improved.

EXTERNAL OTITIS:

Contrary to former teachings, fungus infection of the ear canals is relatively rare. Most painful swellings and/or creamy profuse drainage from canals are due to the Pyocyanous groups (*Pseudomonas aeruginosa*) or other cocci or bacilli. The acute red swollen canal that is tender to touch or manipulation of the ear is very seldom an otitis media. This tenderness is the chief diagnostic point if one cannot see the drum. Parenteral antibiotics are seldom indicated. The most important therapeutic procedure is thorough and repeated cleansing of the ear canal by applicators or suction if available. Local therapy varies with the three stages:

1. Painful swelling of canal: Pack with a cotton tampon soaked in Burrows solution. Continue Burrows and Glycerin (equal parts) or Burrows alone as drops applied to the tampon for a wet dressing effect. Renew packing each day.
2. With relief of intense swelling, apply packs of 3% chloromycetin or aureomycin ointment in vaseline base. These may be in the form of six inch strips of 1/4 inch gauze soaked in the ointment. Renew daily or every other day for several treatments.
3. Further therapy for persistent residual discharge requires evacuation to rear area OPD where thorough repeated cleaning of the canal and application of Castellani paint or other similar local therapy may be done.

MAXILLOFACIAL INJURIES - (Primary Treatment Principles)

Colonel Harold G. Ott, DC, Dental Surgeon, GHQ, FEC, and Lt. Colonel J. E. Chipps, DC

I. GENERAL CONSIDERATIONS:

A well-correlated plan of treatment, carried out from the time the wound is incurred until definitive treatment is available, will greatly shorten the period of disability of patients with face and jaw injuries, and a larger number will be restored to approximately normal function and appearance. Hazard methods should be avoided at all costs. Certain things, therefore, should be done and others should not be done. Attention to the following points will save many lives and facilitate later treatment.

1. The use of local and systemic chemotherapy is indicated as for wounds of other parts of the body. This is particularly important in the treatment of massive wounds involving the floor of the mouth and those associated with compound fractures.

2. Points demanding special attention in primary care.

- a. Control of hemorrhage

- b. Provision of adequate respiratory airway
- c. Temporary approximate reduction and fixation of maxillofacial fractures and adjustment of parts to anatomical position. (Relief of pain, treatment of shock, and other emergency measures as indicated.)

3. Early evacuation to a hospital for definitive treatment.

II. SPECIFIC CONSIDERATIONS:

1. Control of Hemorrhage

- a. Control moderate hemorrhage by pressure from gauze compress and bandage.
- b. Hemorrhage not controlled by pack and pressure will require clamps and ligation of the bleeding vessels. In case ligation is not available and clamp is left on, it should be included in the bandage and marked.
- c. In severe hemorrhage, life may be saved

by application of digital pressure to a bleeding vessel at a control point in its course, until a clamp and ligature can be applied.

- d. DO NOT increase respiratory difficulty by the application of gauze compress and bandage. Bandages should not create backward pressure or traction distally on fractures of the mandible.

2. Provision of adequate respiratory airway

- a. Clear mouth and throat of tooth fragments, detached bone fragments, broken or dislodged dentures, and all foreign matter.
- b. Insufficient respiratory airway can be improved by the insertion of a rubber tube through the nose or mouth to the nasopharynx.
- c. Tracheotomy should be done promptly if more simple measures fail to provide an adequate airway. In some cases of massive injury about the jaw and pharynx, tracheotomy will be necessary as an emergency life-saving measure.
- d. In case of collapse of pharynx and floor of mouth, or loss of control of the tongue, an airway can be maintained by holding the tongue forward. This can be accomplished by passing a suture through the tip for holding it forward. In extreme emergency cases safety pins have been used to transfix the tip of the tongue.

3. Temporary approximate reduction and fixation of maxillofacial fractures and adjustment of displaced parts to anatomical position

- a. Institute adequate measures for relief of pain and prevention of shock. Morphine should be administered cautiously to patients with respiratory difficulty and is contra-indicated for patients with associated cranial injuries.
- b. Cleanse wound superficially, removing tooth fragments, detached bone particles and foreign matter.
- c. Displaced parts should be gently adjusted to anatomical position and gauze compress and bandage applied. Avoid collapsing bone segments and prevent backward traction on the mandible.
- d. Maxillary fractures and fractures of the

adjacent facial bones should be gently supported by stable bandaging. In primary treatment this stabilization can be improved by the application of gauze compresses and bandages used to control hemorrhage. It is essential to aim at re-establishing the former occlusion of the teeth; therefore, all bandages applied should be supportive in this direction. Wire ligatures and suture material, if available, can be applied to the teeth of the same jaw across the line of fracture, to assist in stabilization of parts during evacuation. Multiple loop wiring, with inter-maxillary elastic traction for reduction and stabilization of certain fractures, should be accomplished as early as time and facilities permit. Rigid intermaxillary fixation with wire is definitely contra-indicated in primary treatment for any case that might become nauseated or develop respiratory interference during evacuation. Edentulous cases require bandages that gently support the parts and avoid the tendency to collapse the segments. Dentures should be located, if possible, for use with adjustment and splinting of alveolar parts. Even if broken these should always be transferred with the patient.

- e. Stabilization of parts is essential to avoid recurrent hemorrhage, reduce pain and prevent shock.
- f. A stimulating dose of tetanus toxoid is indicated as for wounds of other parts of the body.
- g. Anesthesia is seldom required for the initial care of maxillofacial injuries. When it is indicated, the general principles set forth hereinafter in the Definitive Treatment Section should be observed.

4. Evacuate patients to a hospital or station where definitive treatment can be provided early.

- a. Ambulant or semi-ambulant patients with oral or pharyngeal wounds should travel sitting up, if possible.
- b. Litter patients should be placed in a comfortable position and prone (face down) so that there is no possibility of interference with respiratory airway or aspiration of fluids.

MAXILLOFACIAL INJURIES - (Definitive Treatment Principles)

Colonel Harold G. Ott, DC, Dental Surgeon, GHQ, FEC, and Lt. Colonel J. E. Chipps, DC

I. GENERAL CONSIDERATIONS:

1. Superficial wounds, when seen early, may be closed by primary suturing, provided they are relatively clean and can be thoroughly cleansed and carefully debrided. Severe maxillofacial wounds with loss of tissue, especially those resulting from gunshot, should not be closed by primary suturing. Specialized care should be instituted as early as personnel, time and facilities permit.

2. When an anesthetic is indicated, first consideration should be given to regional infiltration

or nerve block anesthesia for surgical treatment of severe traumatic lesions about the face. General anesthesia may be necessary if trauma involves structures in the nose, mouth or pharynx. Maintenance of an airway and prevention of seepage of blood into the trachea is essential. General anesthesia in the presence of shock is not indicated unless the contemplated procedure is considered immediately necessary to save the patient's life. When employing a general anesthetic agent in maxillofacial surgery, an endotracheal tube is indicated. Maintenance of Trendelenburg position (10%) will protect against seepage into the lung by promoting drainage

of blood and secretions into the pharynx where they can easily be removed by suction. Insertion of wet packs into the pharynx is also indicated to establish a closed system. If extensive trauma within the mouth or pharynx is likely to be followed by edema or emphysema, it may be necessary to establish a tracheal stoma prior to surgical treatment of the primary lesion, and to use this avenue of approach for administration of the anesthetic by inhalation and subsequently for aspiration of excess secretions.

II. SPECIFIC CONSIDERATIONS:

1. Reduction and fixation of fractures and adjustment of parts to anatomical position.

- a. DO NOT manipulate fractured fragments of maxillae in the presence of fractures of the base of the skull and accompanying injury of the brain until drainage of fluid has ceased and patient's condition approximates normal.
- b. Final control of hemorrhage should be obtained with individual local ligation of bleeding points whenever possible, rather than by the ligation of the major vessel of supply to the affected part. Every effort should be made to maintain maximum blood supply to the part.
- c. The wound should be cleansed thoroughly under the best surgical conditions. Remove all tooth fragments, foreign matter, detached particles of bone and dislodged teeth in line of fracture, since these are elements that invite infection. Do conservative debridement of soft tissues. Excise only tissue that is completely devitalized and tissue which obviously has no chance of survival. Protect nerves, vessels, ducts and glands. The use of small cutting needles and fine sutures place near approximating skin edges will aid in prevention of suture scars. Skin sutures should be removed early.
- d. Bone particles that still possess periosteal attachment should never be removed, since these small vital attachments may make all the difference between consolidation and new bone formation with restored function, and collapsed fragments with the attendant complications; even comminuted viable bone should be saved.
- e. In cases of massive loss of substance, adjust soft tissue and restore torn flaps to normal position. Suture mucous skin and mucous membrane. Avoid closures under tension that produce overlapping of fractured ends of bone or collapse of bone fragments. Provide adequate dependent drainage to deep penetrating wounds, and especially those communicating with the mouth. Immediate suture is only advisable in superficial wounds and wounds that can receive proper care within a few hours after injury.
- f. Fractures of maxillae and mandible.
 - (1) Complete roentgenographic studies should be an integral part of definitive treatment.
 - (2) Aim at re-establishing the former occlusal relationship of the teeth, and ultimate restoration of dental function. Collapse of bone seg-

ments should be avoided in cases with loss of structure.

- (3) The use of labial arch bars or wiring of the teeth of the same jaw across the line of fracture may be indicated for stabilization during evacuation.
- (4) Rigid intermaxillary fixation of the lower teeth to the upper should not be used prior to unattended travel. Intermaxillary elastic traction may be used safely for this stabilization since the mouth can be opened in case of nausea and the elastic bands easily removed or tension regulated as indicated.
- (5) Immobilization of fractures can be accomplished by the application of intra-maxillary multiple loop wires and intermaxillary elastics for reduction and fixation, when sufficient teeth remain in each jaw (Figs. 1 & 2). The application of a vertical circular bandage with mild buccal elastic traction may be indicated for auxiliary support of maxillary fractures (this bandage, made of elastic material will eliminate the collapsing tendency of ordinary bandage).

Fig. 1

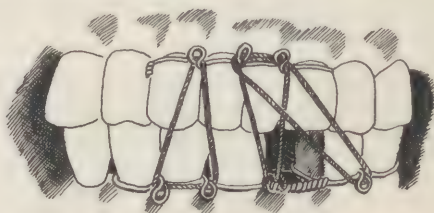
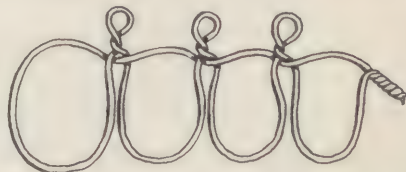


Fig. 2



- (6) Sectional dental splints of proper design and construction may be used to advantage in the treatment of complicated cases for immobilization when limited function is desirable.
- (7) Edentulous fractures require the skillful application of supporting bandages to maintain the parts in proper position, without causing collapse of segments or interference with airway. Dentures are particularly important as they can often be used in connection with supporting bandages or circumferential wiring.
- (8) Another method of reduction and retention of edentulous cases, or those with displaced edentulous

fragments, is afforded by the application of the extra-oral skeletal pin and bar fracture appliance.

2. End results are of paramount importance and should be kept in mind at all times as the final out-

come may be said to be directly proportionate to the nature and character of the early treatment received. Patients with maxillofacial injuries, requiring extended care and reconstructive surgery, should be transferred to the ZI when the treatment has progressed to such a stage that evacuation can be safely accomplished.

AIR EVACUATION

Lt. Colonel Allen D. Smith, USAF, (MC)

Effects of Altitude on Certain Types of Cases -

At altitude certain physiological changes occur. These are the expansion of gas in body cavities and a decrease in the partial pressure of oxygen. Gas trapped in body cavities expands such that at 15,000 feet the volume of gas is doubled. The partial pressure of oxygen in inspired air falls as one ascends to altitude. As the pressure of the oxygen in inspired air falls, the pressure of oxygen in the lung alveoli and arterial blood falls.

The above mentioned changes will cause patients more distress than is experienced in the normal individual. Cases most effected by altitude are as follows: Head injuries, thoracic injuries, abdominal wounds, malaria and other anemias as well as patients in shock.

Effects of altitude can be overcome by flying at low altitudes to prevent expansion of gases. The administration of oxygen at altitude will correct aerohypoxia since the oxygen pressure in the alveolar air and arterial blood is raised.

Cases Unsuitable for Evacuation and Reasons for Same (Including Contagious) -

In a combat theater air evacuation of all types of cases is accomplished even if the risk is great. There is not conclusive evidence that evacuation by air is 100 per cent contraindicated for a particular type of patient or 100 per cent safe for another type. It is believed that any type of case can be transported by air provided the plane is adequately equipped and medical personnel are well trained in the principles of aerotherapeutics. In the movement of 146,000 unselected cases of all types the evacuation squadron in this theater has had a total of twelve (12) deaths in flight to date.

As a general rule unless an emergency exists cardiac cases (especially decompensation), cranial injuries, severe chest injuries, abdominal wounds, pulmonary cases, severe anemia cases plus patients in varying degrees of shock should not be transported by air.

A few reasons cases as mentioned above might be considered unsuitable for evacuation by air are listed below:

- (1) Cardiac Cases: Blood moves too slowly to carry sufficient oxygen to tissues.
- (2) Severe Cranial Injuries: Results in oxygen decrease of 4 to 44% to vital tissues.
- (3) Chest Injuries: In pneumothorax of the closed or ball valve type untoward results may occur on ascent.
- (4) Abdominal Wounds: Recently sutured body cavities such as intestines might rupture if gas volume is greatly increased.
- (5) Pulmonary Cases: In pneumonia where alveolar membranes are damaged the passage of oxygen from

alveoli to the blood is impeded.

(6) Severe Anemia Cases: Oxygen transportation is decreased in severe anemia. (not enough blood elements to transport oxygen to tissues).

(7) In severe shock cases blood circulation and oxygen utilization is involved. The cycle is decreased circulatory blood volume, decreased venous return, decreased cardiac output, tissue lack of oxygen and increased capillary permeability.

Contagious disease cases should not be evacuated by air except in emergencies. However, many contagious cases are evacuated by air, namely, tuberculosis, chronic stages of intestinal diseases, skin diseases, poliomyelitis cases, meningitis, encephalitis and mild upper respiratory infections. In general if good sanitary measures are carried out in flight and the proper cleansing and disinfection of the airplane is accomplished at the point of arrival, all types of cases can be moved without spread of the disease. The control factors in any communicable disease are the source, transmitters and susceptible individuals. Thanks to the good preventative medicine program of the Armed Forces the evacuation by air of communicable diseases does not present too great a problem.

Feeding Requirements Before and During Flight -

Flights are not longer than 4-6 hours. The in-flight feeding problem is therefore one of merely easing the patients' hunger rather than supplying an adequate intake of calories. For this type of feeding cold sandwiches, fruit and beverage (hot or cold) is sufficient.

Patients should be fed before flights; only those whose condition contraindicates food should be allowed to fast. The best diet is one high in carbohydrates. Pilots claim their ceiling can be increased 1,500 feet with a diet high in carbohydrates. High protein diet is the second best and a high fat diet the poorest type.

Special Equipment to be Furnished by Hospital in

Special Cases - Special equipment required to be furnished by the hospital includes intubation equipment, straight jackets, etc.

Oxygen and a respirator can be furnished by the Air Evacuation Squadron.

The hospital should notify the Air Evacuation Squadron of the need for unusual amounts of oxygen or special equipment.

AR 40-535 CNO Letter 20P56, AFR 160-52 states the Commanding Officer of the hospital originating patients for transportation by air is responsible for insuring that instructions regarding special medication, diet, and medical equipment required for proper care and treatment enroute are provided.

4

Neuropsychiatry

This section deals with the most frequent psychiatric and neurological problems of war which were encountered in the FEC during the Korean campaign. In common with the objective of this symposium it is hoped that the various papers contained herein will serve to prepare and orient the newly arrived medical officer in the pertinent clinical material of war whether he be a specialist or a general practitioner. For this reason, psychological illnesses and organic diseases of the nervous system and problems encountered in civilian life or even in peacetime overseas theater are not included in this section since they are adequately described in specific standard textbooks. The various psychiatric articles consider the etiology, clinical picture, treatment and management of the war neuroses in their various aspects.

There are two themes or basic principles which are constantly reiterated because of their primary importance in the understanding of the combat psychiatric casualty. The first concerns dynamic causation. It is stressed that the emotional breakdown of battle is primarily an acute situational disturbance. Less emphasis is placed upon intrapsychic inhibitions and more importance laid on immediate circumstances, including the emotional support and social pressures of the military unit and various physical factors which may affect the adaptative ability of the individual. Upon this basis, a system of brief directive psychotherapy is erected which aims at the rapid uncovering of recent and continuing environmental factors with relatively little attention paid to symptoms and their possible regressive or symbolic significance. This is coupled with the use of all possible conscious internal and external motivating forces to the end that the patient is enabled to suppress or repress symptoms so as to continue to function in what is admittedly an uncomfortable or stressful situation. In effect, an attempt is made to simulate the average psychology of adjustment in the overseas and combat soldier who effectively functions under adverse conditions by the suppression of anxiety and discomfort.

The second theme pertains to the phenomena of the gain in illness and its influence upon manifestations and treatment. It includes the importance of such factors as the effect of time and distance from the traumatic situation and the influence of the location and surroundings of any treatment method upon the eventual outcome of therapy.

The neurological articles are designed primarily to elucidate those syndromes which most frequently confront the neurologist in a wartime setting. The problems of backache, headache, unconscious episodes and blast injury strain the diagnostic resources and acumen of all medical officers since these conditions may have

many causes not the least of which lie in the psychological sphere. The papers on these subjects hope to clarify the many diagnostic and management pitfalls so common in such vague entities in order to enable the medical officer stationed in any echelon of medical service to understand and handle such problems more effectively.

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Colonel MC
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FROM CIVIL TO COMBAT PSYCHIATRY
Colonel Albert J. Glass, MC, Psychiatric Consultant, GHQ, FEC

As in previous armed conflicts, the Korean campaign has demonstrated the need for a reorientation of the civilian psychiatrist who has recently entered the military service. Such an indoctrination is especially necessary when the new military psychiatrist is promptly sent overseas to a wartime theater. Even prior experience with the psychiatric problems of soldiers in the ZI is insufficient preparation for the effective management and treatment of combat psychiatric casualties. The quickened tempo of psychological reactions produced by the impact of war requires the psychiatrist to adapt himself and to alter his therapy techniques in order to adequately perform his mission. Almost all of the newly-arrived psychiatrists in the FEC have experienced such a personal and professional readjustment period of a long or short duration. This paper which has been prepared to facilitate this transition to war psychiatry is felt to be both pertinent and timely.

At the outset, it should be emphasized that the basic concepts and mechanisms of human behavior apply alike to the soldier and the civilian. Like his surgical colleague, the psychiatrist is more or less equipped with the fundamental knowledge required in his field, but must modify his technique and methods to conform with the characteristic clinical material of combat. The psychiatrist is ever the exponent of reality as he constantly endeavors to direct his patients toward a better integration with their environment. His goal is always to discourage or circumvent the continuation of immature or ineffectual adaptation of the individual and to foster adult patterns of behavior whether this be in a civilian environment or the hazardous life of an infantry unit.

The key to the difference between civilian and combat psychiatry lies in the terrors of battle and the deprivations of overseas existence which must be borne by the soldier as compared to the usual vicissitudes of either a rural or urban community life. It is as if the same, but slower and unconscious, psychological conflicts which cause mental illness in times of peace are subjected to the heat of war. The result is an acceleration of the emotional process with an associated rise to the conscious surface of dynamic forces which ordinarily remain repressed in the deeper realm of the unconscious. When external stress is decreased coincident with removal from a dangerous area, there is usually a prompt subsidence of the intensity of symptoms which accounts for the changing clinical picture so characteristic of the war neuroses. Because fear is ubiquitous in combat, even the effective soldier has uncomfortable subjective sensations. Such feelings are only quantitatively less than that experienced by the psychiatric casualty.

At times it may be difficult for the psychiatrist to distinguish an individual with a disabling reaction from one who only suffers with the usual battle discomforts, particularly when the patient is evaluated in the relatively safe area of a medical unit.

The military psychiatrist must also become familiar with forces which sustain the soldier against fear and deprivation. This protection originates from the group which not only safeguards the individual from external danger but the strong and personal relationships generated by common participation under adverse conditions affords the person some degree of gratification for his emotional needs. The morale of the unit is a potent power in its effect upon the motivation of the soldier to continue enduring hardship.

The various aspects of the transition from a civilian to an overseas wartime psychiatric practice are considered individually in the following sections. The subjects to be discussed should not be regarded as separate entities but rather viewed as different facets of the same process.

ATTITUDE TOWARD THE MILITARY PATIENT:

In civilian practice, the patient is placed in a position of preeminent importance. He expects the physician to consider only his needs and desires. By contrast, medical officers, including the military psychiatrist, are concerned primarily with the welfare of the group. This change of attitude is more difficult to accomplish by the new military psychiatrist than it is for his other medical colleagues. The work of the psychiatrist deals largely with the needs, hopes and wishes of his patients. The major source of the psychological symptoms of the soldier is a conflict between selfish drives and obligations to the unit. The psychiatrist should align himself with the group instead of with the individual in this struggle. He must apply his professional skill in such a way as to either encourage or insist that the patient give up personal wants in favor of group requirements.

Basically the civilian psychiatrist performs a similar function by efforts to integrate the individual within the less severe demands of the existing social culture. However, this is a more gradual process, as in time the psychiatrist brings the patient to realize that his personal interests are best served when impossible or antisocial wishes are relinquished for the more permanent benefits obtained by participation with the group. Such time-consuming treatment would not only be impractical in a combat setting, but

could be readily utilized by the neurotic desires of the patient as a means of avoiding return to duty with a consequent fixation of disabling symptoms.

PSYCHODYNAMIC CONSIDERATIONS:

The mental breakdowns of war are considered to be primarily the result of external stress. The essential mechanism is an overwhelming of the person by an influx of excitation which cannot be handled or adequately discharged. The result is a damming up of tension which interferes with the effective function of the individual. For this reason the evaluation of recent or acute situational trauma is of major importance in the dynamic formulation of most cases encountered by the military psychiatrist. The role played by infantile or childhood vicissitudes and previous environmental strife is only of value in assaying the personality pattern which succumbed to the degree of stress that was inflicted.

The military psychiatric patient is especially prone to displace responsibility for current symptoms and behavior to habit patterns or past difficulties. He readily gives a history of a broken home, childhood deprivations and neurotic traits, previous episodes of nervousness or prior inability to perform duty under similar conditions. The following spontaneous remarks of patients are frequent: "I've always been nervous"; "I never could stand excitement"; "I can't stand being pushed around"; "I blow my top easily"; "I can't kill anybody, I'm afraid to step on a fly"; "I had the same trouble in the last war".

If the psychiatrist accepts the patient's premise that his personality constitutes a disability for his current assignment or obligations, the patient is then in control of therapy and the psychiatrist acts merely as a technical advisor for the proper terminology needed to describe the alleged incapacity. The psychiatrist is then forced to the inevitable conclusion that physical removal of the patient from his situation is the only solution. A similar defense is presented by the patient who insists that he has disabling back pain, as he states "cure my back, doctor, and I'll be glad to go up there." Since it is impossible to cure his back, logically he cannot "go" anywhere except away from "up there".

It is a time-wasting procedure, both here or with the patient, to debate whether such defenses are conscious or unconscious. It is more profitable to approach the problem by placing emphasis upon the particular situation which produced the present difficulty. The patient is forced to consider that his behavior and feelings were a result of realistic factors and that responsibility for his symptoms cannot be displaced to a remote event. It is only then that the neurotic conflict can be handled on an objective basis.

It is a commonly stated axiom of psychiatry that mental disease is a product of the interaction of stress and personality. No doubt this is true, but it is too simplified a version for practical utilization. The quantity estimates needed to support such an equation are difficult if not impossible to obtain accurately from the clinical data. A similar obstacle exists in the use of the rule that everyone has his breaking point depending on the amount or intensity of combat. Here, too, it is impossible to judge the degree of stress. Should the patient's statement be considered sufficient or is it to be an arbitrary number of combat days?

It is more realistic to be aware that under the term "stress" is subsumed multiple elements, the nature of which are difficult to obtain and evaluate from the patient's story. The division psychiatrist is more expert in the quantitative estimation of stress factors than the rear or less experienced psychiatrist. This particularly applies to the intensity of external hazards as judged by its effect upon the majority of men under similar battle situation. The most accurate measure of external fear is the comparative battle casualty rates of the various tactical combat units.

An integral part of the situational conflict of war is the sustaining power of the group. This is seldom crystallized by the patient since it involves feeling tones, not easily verbalized. Yet it is intimately bound up with stress, because the failure of unit motivation or leadership to support the individual may precipitate an emotional breakdown. The removal of the protective mechanism figuratively and literally leaves the soldier in a vulnerable position to withstand external stress.

There are physical factors which may participate in this already crowded emotional conflict. This involves the lowering of the physiological defenses of the body by fatigue, lack of food and sleep, or intercurrent illness as diarrhea, malaria and the like. The soldier is unaware of this complication which operates to lessen his ability to mobilize aggression and thus externally discharge the tension produced by fear. He only realizes that it is impossible for him to continue effective duty as he states, "I can't go on any more", "I can't take it", or "I'm no good for the front lines".

If an adequate estimation of the stressful situation is considered difficult, the realistic evaluation of personality is even more complicated. There is insufficient time for a thorough inventory of character traits and their genetic causation. Moreover, all available information is usually only obtainable from the patient who may be consciously or unconsciously biased to accent this or that past experience in an effort to rationalize failure. When the imperfect estimation of personality is added to the incomplete data of the current stress, it becomes obvious that the use of any simple stress personality formula may be misleading.

As the military psychiatrist becomes more experienced he learns to place more reliance upon feelings and attitudes pertaining to the present environmental difficulty. He comes to understand the milieu of the soldier and the varying degrees of stress in battle situations. He finds that more pertinent and reliable information can be obtained from the patient by his behavior under therapy which, when combined with his reactions in combat, give valid indications of the dominant personality patterns. The past history of the patient is then useful in further extension of knowledge about his resources and limitations.

Attention to the current situation also reveals the existence of strong motivating and internal compelling components of the personality which were part of the sustaining power that originally maintained the soldier in battle. Not infrequently these personality factors are found to be actively participating in the present symptoms and behavior of the patient. Such superego forces when overly severe may account for depressive states as they harass the patient with self-critical condemnation of his battle performance. It is this personality element which at-

tempts to fixate the patient to memories of combat. Such thoughts can be suppressed during the waking state, but at night they return in the form of battle dreams which are another effort to master the combat situation and undo the previous failure. In some cases the continued tension and discomfort after removal from battle seems to be a neurotic payment required by the superego in order to permit the selfish gains of illness.

GAIN IN ILLNESS:

In our culture, every non-fatal illness which is incapacitating may carry with it a gain of being relieved from obligations with some of the privileges of childhood. In civilian life, this is seldom recognized or utilized as such for tangible benefits, except in compensation practice. In war, with its harsh demands upon the soldier, the gain in illness is readily appreciated and not infrequently is the conscious or unconscious basis for the continuation of symptoms.

While the gain of physical disease is usually a fortuitous coincidence, the gain in mental disease is an integral part of its causative neurotic mechanism. Psychological symptoms are a manifestation of an unconscious intrapsychic compromise with the demands of the external world in an effort to obtain some degree of gratification even if this be of the infantile type and accompanied by suffering or inhibition. The severe stress of combat, in contrast to the frustrations of peacetime, provides such an obvious reason for the gain of emotional breakdown, that such casualties have at times been regarded with scorn or disbelief. This differs sharply with the acceptance of the incapacity produced by an outside agency as disease or injury. As a consequence, psychiatric patients may cling desperately to somatic symptoms, such as headache, in order to prove to themselves and others that their disability is honorable and not a conscious avoidance of the battle situation.

Because the gain in mental illness is intimately bound up with the neurotic defenses of the individual, it plays a large role in resisting treatment. This is especially true if time and other circumstances are allowed to continue the initial benefits of disease, namely the avoidance of adult obligations. From the foregoing, it is logical to expect that the amount of time utilized in therapy and the location and environment where treatment is given become of major importance in the success of any therapeutic program.

The division psychiatrist is in the most favorable position for treatment. The patient is not too far removed from his traumatic situation from the standpoints of distance, time, or comfort, to allow a large degree of fixation of the gain in illness. Moreover, he is still under the influence of positive motivation from the group.

Psychiatric patients are much more resistant to therapy in a general hospital atmosphere in Japan, where the difference of time, distance and comfort from their original situation and almost complete separation from group spirit and loyalty, tends to encourage and increase the neurotic gains of illness to form a chronic process. Such patients may become resentful and hostile toward attempts at therapy or decisions that they can perform less hazardous duty. The success of the neurotic gain producing mechanism fosters a repetitive pattern that seeks even more tangible benefits such as medical evacuation to the ZI.

The picture is quite different when psychiatric casualties are sent directly from Korea to a convalescent hospital in Japan. Although time and distance factors are the same, the practical and objective environment of this type of installation acts to nullify the gain of symptoms. Patients soon become aware that no further benefits can be derived from illness except that accrued from the exercises and marches of the daily reconditioning program. Moreover, all patients are being returned to duty - none are being evacuated to the ZI. It is then that neurotic defenses are weakened and the way opened for therapy.

The military psychiatrist must become thoroughly familiar with the phenomena of illness gain and the effect of various tangible factors which may modify its intensity. Yet, despite its prominence in the clinical picture, he should not be deceived into believing that the secondary gain is the cause of emotional breakdown, but rather come to recognize this manifestation as a typical neurotic defense which arose from an inability to master a conflict caused by external stress. At first it functions as a protective shield against return to the traumatic situation, later, it operates as a barrier to participation in any disagreeable or onerous obligation. The individual is never really content with this state of affairs because of self-critical evaluation and because the gratifications obtained by its use are not of an adult type and not truly satisfying. This accounts for the continued irritability, insomnia and hostility of such chronic patients who often project their self-directed anger on to the environment.

THERAPY:

Any effective therapy of the war neuroses must be based on such realistic considerations as the amount of available time, the environment and location of the treatment situation and the focusing of attention upon the current feelings and attitudes of the patient as related to his recent traumatic experience. Magical maneuvers and methods, such as non-convulsive shock therapy, which the patient cannot understand, will not suffice and, at best, give only temporary and face-saving improvement. Theoretical formulations about this or that dynamic process which originated in childhood and is being repeated in the present, may satisfy the psychiatrist but rarely helps the individual and even if valid only adds insult to injury. The truth is, that the psychiatrist has the difficult task of adjusting the unchanged personality to the stress, vicissitudes and obligations of an environment that has already caused him to become a casualty. It is impractical for the psychiatrist to believe that he can alter basic character traits by the brief therapy methods under the particular circumstances which he must operate. In effect, therapy must be aimed at the repression and suppression of symptoms rather than the uncovering of deeply repressed unconscious material.

In order to meet the above requirements, most combat psychiatrists have developed their own individual form of brief directive psychotherapy which utilizes face to face interviews. The patient is encouraged to spontaneously tell his complaints and difficulties, but there is no participation by the therapist in rambling or long accounts of symptomatology or other defenses of the patient. Instead, the psychiatrist insistently directs the patient to talk about the feelings and experiences that produced his breakdown. When the patient balks on giving this type of information, it is expedient to approach his

conflict indirectly by shifting to routine questions pertaining to his initiation in the military service, his thoughts about coming overseas, his early days in combat, what changes, if any, took place since then, the feeling about his organization, particularly such members as friends and buddies and thus gradually bring the patient to talk about the recent episode that caused him to become a casualty. By concentrating on situational events, the psychiatrist can more accurately understand the manifestations of the patient and act as an objective bridge for him to rationally view his illness as a logical outcome of environmental forces. Following the exploration of the present difficulties, the therapist may direct attention to such past experiences and feelings that will aid him to better evaluate the personality structure of the patient. The psychiatrist is then in a position to estimate the future management of the patient as to either the need for further treatment or recommendations for assignment to combat or non-combat duty. It is evident that the psychiatrist must work from the surface downward rather than from below upward.

By this method, the therapist avoids contending or struggling with the patient's defensive shield of symptoms, displacements or rationalizations and strives for a direct access to the current internal conflict. It is then that harassing, self-directed criticism can be handled and mitigated and the tools of reassurance, explanation and persuasion can be utilized as adjuncts to the previous ventilation of the patient.

During the interviews the attitude of the therapist should be friendly and sympathetic. Like a good father, he is neither severe, harsh or overly indulgent as he aids and directs the patient toward the resumption of adult obligations. The psychiatrist should try to maintain a favorable doctor-patient relationship yet cannot be intimidated by symptoms or threats. It is a good policy to avoid acrimonious disputes with patients who demand tangible benefits or insist on maintaining their symptoms. It should be realized that some patients would rather externalize their painful internally directed aggression. Arguments with the therapist gives these patients a pseudo-logical basis to project their problems and thereby continue the defense of symptoms. However, the psychiatrist should not tolerate uninvited personal abuse.

The number and frequency of interviews must be flexible, dependent on the location of treatment, severity of the illness and the available time. In divisional areas, perhaps only one interview may be necessary since here, the patient's defenses are not fixed as he readily discusses and accepts current situational factors. In rear areas, with the more severe case who has already achieved gain in illness, several to many interviews may be needed.

Barbiturate interviews may be valuable in selected cases. The psychiatrist should not be deceived by the magic of "abreaction" which can have no lasting value unless such material of the current situation is integrated consciously as part of current conflict. Actually, the use of barbiturates only aids in gaining access to the patient whose symptoms block the usual avenue of direct approach. Thus, it is useful in patients with the hysterical defenses of amnesia, blindness, deafness, aphonia, paralysis and the like; also in those individuals with such severe anxiety that they are unable to speak coherently. It is an interesting observation that the more forward the psychiatrist treats his patients,

the less need does he have for the use of barbiturate interviews. This is mainly because defenses have not solidified and there is ready access to the patient. It is pertinent to note that barbiturate interviews should not be given over the patient's objection, since little of value is obtained and the patient is rendered even more determined to block intrusion into his conflict than before, with some justification for his attitude.

Hypnosis may be used for the same purposes as barbiturate interviews, if the therapist is sufficiently skilled in this procedure. It is probably preferable to barbiturate interviews because there is less of the element of physically overcoming the patient's resistance. If at all successful, it indicates that the therapist has achieved a satisfactory working relationship with the patient which can be continued in the waking state.

PERSONAL ORIENTATION:

The transition to combat psychiatry involves a personal as well as a professional readjustment period. Both are intimately linked together since the qualms, prejudices and other emotional problems of the psychiatrist have a pertinent relationship to his ability to successfully handle the psychological difficulties of others. For example, the newly arrived psychiatrist may be emotionally disturbed by overseas separation and other similar vicissitudes that affect the patient.

Perhaps the major obstacle that must be overcome by the new military psychiatrist lies in the phenomena of identification. This basic mental mechanism that is responsible for the internal awareness of the feelings of others is, for the psychiatrist, a major tool of perception. By this means, he is able to understand his patients by literally feeling with them their emotional problem. The decreased ability or absence of this method of communication with the patient renders the psychiatrist relatively blind, in a figurative sense, to either efficiently diagnose or treat mental illness. An over-identification with the suffering and trials of the patient is equally undesirable because the psychiatrist is no longer able to objectively evaluate symptoms and adequately conduct therapy.

The difficulties that arise from the identification mechanisms of the new military psychiatrist mainly stem from the simple fact that he has entered a new environment and therefore lacks the measuring rod of personal experience needed to objectively estimate the feelings generated from the patient. In general, the new combat psychiatrist, like the newcomer to psychiatry in civilian life, tends to err in the direction of over-identification. This is not surprising since it is human to be strongly affected by the feelings of others. The result is an over-evaluation of the manifestations of the patient which impels the psychiatrist to accede to his neurotic wishes and demands. In an effort to prevent this error, some psychiatrists may reject any identification by the process of projecting such feelings to the patient, thus blaming him for exaggeration or conscious evasion. While this may be true, it should be a clinical impression and not arise from the emotional insecurity of the psychiatrist.

A less troublesome, but frequent problem that confronts the new combat psychiatrist, as well as any new medical officer, is the feeling of guilt which may arise when his medical recommendations cause the

discharge of patients to more hazardous duty environment than the psychiatrist is required to endure. It is enhanced by the fact that patients are prone to place the professional relationship on a personal basis. This is especially true when the psychiatrist becomes emotionally involved in a therapeutic situation. Such guilt feeling may influence the clinical impression of the psychiatrist toward alteration of his recommendation with regard to return to duty or further evacuation.

There is no simple formula to avoid the stress and strain inherent in the work of the psychiatrist. Obviously it is necessary that the psychiatrist maintain his objectivity. This is best done by identification with the needs of the group rather than with the immediate wish of the individual. In the last analysis, such a policy serves also the best interest of the patient in that it operates to discourage his immature and ineffectual adaptation. Otherwise, a

chronic neurotic individual would be produced who would be of little value to himself or others.

This paper would not be complete if it did not mention the personal and professional rewards for the civilian psychiatrist who has had the experience of being a combat psychiatrist. The demands upon the individual by the stressful atmosphere of war are only an exaggeration of similar demands by the competitive civilian world. The necessity of concentrating first upon the situational factors is a valuable lesson for future civilian practice. The psychiatrist comes to understand better the unconscious dynamics of civilian neurosis by first hand observation with the more manifest and rapid, but similar mechanisms in combat neuroses. Finally the practical experiences, friendships and associations with overseas and combat units are of considerable value in his own maturing process which will enrich his later personal and professional development.

DIVISION PSYCHIATRY

Major Hyman Bolocan, MC, Division Psychiatrist, 2d Infantry Division

This article is written with the objective of aiding the newly arrived division psychiatrist to become more readily familiar with his assignment. It includes a discussion of the management and care of neuropsychiatric casualties at the division level as well as a discussion of administrative problems which confront the psychiatrist in the field.

The duties of the division psychiatrist are manifold. While he is responsible for insuring that the psychiatric casualty will receive optimum treatment, it is also his function to maintain the conservation of manpower by limiting losses through psychiatric evacuation channels. He must always bear in mind that one man evacuated unnecessarily may affect the morale and fighting efficiency of a whole platoon which may be equally desirous of escaping a stressful situation. It is part of his duty to provide accurate records and statistics in order to pinpoint divisional units which have a disproportionate number of psychiatric casualties. Finally, he must be prepared to teach and orient other medical officers in the handling of psychiatric patients.

The psychiatrist usually works at the holding platoon of the Clearing Company where cases can be held for treatment. At this level, also, he can conveniently act as a consultant to the other medical officers of the unit on vague diagnostic problems. Since specific equipment for an NP unit is not authorized, the physical facilities needed must depend upon those made available by the Clearing Company. The extent of such equipment supplied will vary according to the tactical situation and the attitude of the senior divisional medical officers towards the psychiatrist. Although the psychiatrist must and should work closely with the rest of the Clearing Station, he should insist on maintaining the psychiatric services as a distinct unit with separate tentage and personnel. It was found that when psychiatric and organic casualties were mingled together in the same ward they tended to "contaminate" each other. Psychiatric casualties picked up new physical symptoms and medical casualties began to place emphasis on their anxiety and tension. When placed in separate tents mental patients were less reluctant to accept the fact that their somatic complaints were psychogenic in origin. If possible a small wall tent should be obtained for private interviews. If this is not

available, a portion of the patients' ward tent can be partitioned off with blankets to give a semblance of privacy.

The enlisted personnel assigned to the psychiatrist usually have had some formal training. More important however, is the fact that they have a warm, sympathetic attitude towards the combat soldier. The value of a good non-commissioned officer cannot be overestimated because he is able to relieve the psychiatrist of much burdensome detail. He is responsible for the maintenance of accurate statistics and records pertaining to the work of the division psychiatrist. In his duties on the ward, he records pertinent observations on the patients' general behavior which are invaluable in helping the psychiatrist assess the degree of disability. Patients often form warm relationships with the ward personnel to whom they ventilate freely during their recovery period. If the NCO is trained in social work he can be further utilized in obtaining background data. During a busy period, the well-trained assistant can aid the division psychiatrist in the rapid screening of incoming casualties.

LIAISON WITH OTHER OFFICERS

The division psychiatrist should endeavor to maintain close liaison with various key officers in his division. Statistics of casualties alone do not always give a complete picture of the divisional situation as regards mental health. An intimate knowledge of both the personality and policies of unit commanders in their control of their men is necessary in order to correctly evaluate the problems of the various divisional units.

The battalion aid station and regimental collection stations are good "listening posts" for psychological difficulties in the respective units. The well-informed battalion and regimental surgeons are of immeasurable help in keeping the psychiatrist informed on local morale problems. In turn it is his duty to aid them in evaluating ill-defined cases and to advise on the handling of mild personality disorders. Somatization reactions which may be of minor difficulty to the psychiatrist can be quite vexing to the battalion surgeon. Moreover, a second opinion will

bolster the attitude of the battalion surgeon in his recommendations. As the Korean campaign progressed it was found advisable to prepare reprints on the handling of psychiatric casualties for distribution to the replacement medical officers arriving in the division.

Contact should also be maintained with G-1 (Personnel), the Judge Advocate and the Adjutant General of the division, since these officers are all vitally concerned with personnel problems. When troops of the other UN forces were evacuated through divisional medical channels, policies were arranged with their medical officers as to the further handling and disposition of such casualties.

TREATMENT AND DISPOSITION

General:

Patients are interviewed as soon as possible after admission. The clinical picture changes so rapidly that an initial brief impression of the patient is essential for a later evaluation of the case. Individuals who were totally disoriented and confused on admission often became alert and clear after twenty-four hours of rest and sleep. Objective signs at this later time might lead the psychiatrist to believe that the case was only of mild severity. Experience has indicated that often such cases who have had a severe disruption of personality do not perform well when returned to combat duty.

The disposition should be decided promptly with such a decision imparted to the patient. The individual should never be told that "we will see how you do after a few days of rest". Not only will he be less likely to give up his symptoms, but the anxiety attendant in waiting for a decision will only interfere with the restorative value of the relief from battle.

Patients to be evacuated were reassured that no serious or permanent illness was present but that they were being sent to another hospital because a longer period of rest was required than could be obtained at the division level. Patients who remained for treatment were told that they only suffered from physical and mental exhaustion and would require a few days of rest. The first 24 hours patients were permitted to sleep or do as they wished. The next day, each patient was expected to shave, wash, make his own bed and go to the mess tent. Sedation was rarely prescribed. Most cases had already received small doses of barbiturates in the battalion or regimental aid stations. It was found that the average case of combat exhaustion unless severe was usually asleep after being reassured that he would be allowed the time and place to recuperate. Somatization reactions seldom derived benefit from sedation which could easily be utilized by them as a "crutch".

Psychotherapy was brief, consisting of encouraging the patient to ventilate his feelings and the discussing of details of the recent battle incident in which he was involved. Each patient was reassured that he had done well and would continue to do a good job in the future.

Combat Exhaustion:

Severe cases who demonstrate confusion, disorientation, stupor or abnormal excitement should be evacuated at once. Individuals who show no objective signs of anxiety at the clearing station but whose EMT indicate by notes from unit commanders that described panic, freezing or other overwhelming anxi-

ety reactions, should be considered as disabled for combat. In effect, such notes from the combat commanders should be honored. A practical point was gleaned from experiences along these lines. The division psychiatrist is sometimes confronted by a patient whom he had previously evacuated because of severe combat exhaustion but who was returned to duty after several days in a rear hospital only to breakdown promptly in battle. Undoubtedly, when the case was first seen by the division psychiatrist he evacuated the patient with no comment, since it seemed obvious that the patient was severely ill. However, the clinical picture changed so rapidly that upon arriving in a rear hospital, the patient appeared quite well and was returned to duty. For this reason, a brief descriptive note from the division psychiatrist is essential in order to enable the next echelon of psychiatric treatment to evaluate the individual properly.

Combat exhaustion cases not considered severe enough for evacuation were given several days of rest and recuperation with a chance to ventilate situational stress problems. An important part of the "get well process" was an opportunity to exchange "war stories" with friends in their own or other wards of the clearing station. This both aided the ventilation process and permitted the patient to obtain some ego satisfaction from his past performance.

Somatization Reaction:

Patients with somatic complaints were given a complete physical examination. Even during those times when the psychiatrist was very busy such an examination was found in the long run to be time-saving rather than time-consuming. Early cases of infectious hepatitis or influenza are not infrequently missed because of the rush of casualties in the battalion aid station. Such errors could be readily corrected and individuals placed in the proper medical channels. In addition, many persons claimed that they were quickly shunted through induction centers and therefore had never been given a satisfactory examination and displayed anxiety over minor defects. It seemed that much conscious concern was relieved by a physical examination. It also forestalled the practice of individuals who presented new complaints just as they were about to be discharged to duty. Many soldiers seemingly "saved" a complaint which they would present if returned to duty, such as a frozen toe, an old unhealed wound, or a skin rash.

Psychodynamic interpretations were of little value in most cases, and it was not expected that the patient should have insight into the mechanism of his somatic symptom prior to being returned to duty. He was never told that his symptoms would improve but rather that they represented a normal reaction to tension which every one had to "live with". He was also told that medication was only at best of temporary benefit. This was done with the hope of preventing repeated sick call visits for somatic complaints.

In those cases in which the battalion surgeons had made a medical diagnosis on the EMT or when individuals had been told by a civilian physician that they had had a definite organic disease, the fixation was at times severe enough that it was necessary to have such individuals examined by a board of three physicians held at the clearing station. The results of such a board were then imparted to the patients and if they were returned to duty a note was sent to the battalion surgeon informing him of the findings of the informal clearing station board. This helped to

relieve the impression of the battalion surgeon that he might have missed an organic illness and gave him a basis to utilize a firm attitude toward subsequent complaints of the particular soldiers.

Ward personnel were urged to keep an accurate record of the patient's activity. This included food and bowel habits, the question of vomiting, if pertinent, or the persistency of other symptoms when the patient was not being observed by the doctor. It was found that the disposition of a man with somatization reactions accompanied by little overt anxiety was best accomplished as soon as possible. Prolonged treatment and explanation did not lead to improvement but only served to encourage secondary gain.

Conversion Reaction:

Conversion reactions represented by major extremity paralysis presented a special problem. They were frequently litter cases and represented an extra burden to the meager personnel resources of the psychiatrist. The division psychiatrist must find the technique for the treatment of such cases which is best suited to his particular personality. Sodium amytal interviews were used rather extensively at first by this writer, but soon abandoned. The production of large amounts of significant material were obtained from these interviews, but the results could only be classified as mediocre. Strong suggestion alone was then substituted with an insistence that the patient walk or use the affected part as quickly as possible. This was successful for only an initial period; there were a rapid relapse into the original defense pattern. During the rush of casualties and the lessened time that could be spent on each patient, the following method was found to be most successful in the treatment of the conversion reaction.

An immediate physical examination was done. The patient was assured that there was no serious disease and what had occurred to him was not uncommon with combat soldiers. He was instructed that he was to stay in bed until the following morning at which time he would be expected to arise, go to the "chow" line and perform other personal necessities for himself. It would appear that the defenses were strongest at the time of admission and weakest after a good night's sleep, when the anxiety which produced the defense was lessened. This technique was found to be most profitable for this writer. Other psychiatrists will no doubt find the method most suitable for them as they gain experience with large numbers of similar casualties.

Character and Behavior Disorders:

A fixed character and behavior disorder cannot be expected to respond to brief psychotherapy at any level of treatment. A patient's capacities must be evaluated and reassignment advised only if it is felt that he will be able to perform useful duty under less stress. Passive-dependent personalities and enuretics usually fall in this category. Aggressive character disturbances and antisocial personalities are likely to cause difficulties regardless of their assignment and psychiatric evacuation channels should not be used as a substitute for disciplinary or administrative proceedings. Unit commanders should be advised by letter that the proper disposition of such referred cases can only be through administrative channels by use of existing Army Regulations.

Medico-Legal Problems:

When a division is in reserve, a large part of the psychiatrist's time is consumed in interviewing cases referred for pre-trial investigation as to the mental responsibility of the accused. A thorough knowledge of the contents of TM 8-240, "Psychiatry in Military Law", September 1950, is essential. The psychiatrist should insist that he be provided with the available information concerning the details of the alleged offense. The psychiatrist's report may be certified which relieves the necessity of his personal appearance at the courts-martial. The interviews with medico-legal cases may give valuable clues as to the morale and motivation of various divisional units.

Foreign Troops:

Foreign troops unable to speak English presented an unusual problem. Reliance was placed upon the reports of their own medical officers as to evacuation. A foreign physician not formally trained in psychiatry, but well-oriented in techniques at the division level was able to accomplish excellent results. Such was the case with the French and Dutch battalions assigned to the 2nd Division whose medical officers maintained a close liaison with the division psychiatrist. Direct contact of the foreign medical officer was absolutely necessary in the evaluation of the somatization reactions of foreign troops. On the other hand, anxiety reactions benefited by rest and a few words of reassurance, even if transmitted through an interpreter. The French and Dutch as a rule represented an older age group than the average American soldier and were usually quite well-oriented politically with good motivation.

Motivation:

The Korean campaign was unique in that at no time was there any definite final goal placed before the soldier. In previous wars the enemy was to be defeated or so much territory was to be taken. The soldier could then at least in fantasy look forward to a conclusion of his mission and the eventual return home. However, here was a situation in which no man in the line knew for certain whether the Yalu River, the 38th parallel, or some other line was his eventual goal. Early in the Korean action, men could not be properly indoctrinated and raised the inevitable question of "why are we here?" Such factors may be detrimental to morale and contributed to the hostility of the patient when he was returned to duty. Although for a long time this lack of a main goal was a factor which militated against good motivation, the establishment of a rotation policy has helped to offset this difficulty. However, rotation is not without its own problems. It, in turn, has given rise to cases of rotation anxiety. Many good combat veterans were evacuated with overwhelming anxiety just prior to the time when they believed they were to be rotated. They had become suffused with a feeling of impending doom consisting of a fear that something would happen to them now that they were about ready to leave. Many were not able to express this anxiety but simply stated that they could not understand why they were anxious. The approach of returning home also raised possibly previous neurotic problems of adjustment in the ZI.

CRITERIA FOR DISPOSITION

The tactical situation determined to some extent the number of cases that could be held for treatment at the clearing station. If an immediate move was contemplated and transportation was limited, cases were of necessity held down to a minimum. If the situa-

tion was stable, the psychiatrist could operate on a basis of a 4-5 day holding policy. During the winter months, the cold weather was often so severe that patients were unable to keep warm at night and proper sleep and rest could not be obtained. It was obvious that such a condition had to be taken into consideration in the number of patients held for treatment. In general, criteria utilized for determining the disposition of combat psychiatric casualties were similar to those laid down in the pertinent chapters of "Combat Psychiatry", Supplemental Issue, Bulletin U. S. Army Medical Department, November 1949.

Subjective complaints alone without objective findings were rarely a basis for evacuation. The soldier who stated "I just can't stand those shells", or "I just can't go on", but who demonstrated no anxiety was usually an unwilling or poorly motivated individual. For the purpose of maintaining morale of the men in his unit, he should not be allowed to escape through medical channels. The psychiatrist must evaluate psychiatric casualties against the background of the normal combat reaction. Mild tremor, occasional gastrointestinal distress, urinary frequency, nocturia, nightmares and mild depressions are to be expected. Coarse tremor, excessive restlessness and severe startle reactions are grounds for evacuation. As the psychiatrist becomes more experienced, he will gain more proficiency in evaluating the clinical picture which will enable him to make rapid, dependable decisions of patients for disposition. Although good motivation is desirable the psychiatrist must be on guard in returning individuals to duty merely because of their desire. Such requests may stem from a strong sense of guilt in individuals with disabling anxiety. Many soldiers exhibit hostility at being made to return to a stressful situation. It is healthy when such in-

dividuals can express their resentment. Some personality types express themselves in a passive way by threats of suicide or self-mutilation. The psychiatrist must not be intimidated by such threats or reveal by anxiety that he can be personally involved. The reality situation is pointed out to the patient together with the fact that he is legally responsible for any of his acts, including that of a self-inflicted wound.

While in reserve, it was found that approximately 50% of the patients referred to the psychiatrist could be returned to duty. It was wise to use this period to weed out character and behavior disorders. During battle about 65% of cases evacuated to the clearing station are returnable to duty status.

In evaluating officers, it must be remembered that the platoon leader and company commander play a tremendous role in the maintenance of morale in their unit. Confidence in leadership and identification with the unit strongly mold men into a cohesive, well-integrated combat force. This in turn keeps down the number of psychiatric casualties. For this reason officers who show evidence of breakdown or who demonstrate that they lack the qualified of leadership should be removed from their units.

In obtaining the history of a patient, importance should be laid upon the immediate battle situation. The story of narrow escapes from death, past wounds, the death of a "buddy" and length of time in combat are pertinent in evaluating the stress under which the individual had his breakdown. Such information usually bears more weight than the background data of early life trauma in deciding whether a patient should be returned to duty or evacuated for further therapy or reassignment.

COMBAT EXHAUSTION

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The term "Combat Exhaustion" is applied to the well-known acute psychiatric battle casualty to designate a temporary psychological failure of the soldier to function adequately in a combat situation. The manifestations of combat exhaustion are diffuse and may involve both the psychic and somatic spheres. Characteristically the signs and symptoms are quite variable. The clinical picture may change in a matter of hours or from day to day. Many cases are mild, as exemplified by those individuals who only verbalize the subjective sensations of fear in battle with no objective evidence of anxiety. Other psychiatric casualties are more severe, with tearfulness, depression, gross tremulousness, or hysterical blindness and paralysis. A smaller group of cases exhibit such a severe disruption of personality function that they are out of contact with their environment and present a transient psychotic syndrome.

The acute mental breakdown of combat is an age-old phenomenon. Even the bible records the panic and paralyzing fright of participants in battle. It has always been considered good military strategy to weaken and disorganize the enemy by utilizing the crippling effects of fear stimuli. The use of bugles, cymbals and whistles as currently employed by the Chinese troops is an ancient maneuver of this type. Indeed, the Walls of Jericho were figuratively, at least, disintegrated by the blowing of a trumpet. In modern warfare, artillery

fire and air attacks are the most prolific producers of fear as well as actual battle casualties. It is an old military axiom that one never wastes artillery shells so long as they are hurled at the enemy. Even animals utilize fear-producing tactics, as exemplified by the roaring of the lion which renders the victim helpless before the actual attack.

It is evident that any method designed to increase the strength and number of fearful stimuli may serve to undermine the ability of individuals to react aggressively to a source of danger. This occurs because the subjective sensations of fear are never helpful to the person but are painful. They make it difficult for him to think logically, and operate to inhibit physical activity. Only the physiological concomitants of fear are valuable in that they prepare and support the soldier for the increased bodily demands required for fight or flight.

The emotional overtones inherent in the words used to label the combat psychiatric casualty are of major importance; they affect the attitude of the patient towards his condition as well as influence the opinion of his fellow soldiers, friends, and family. Prior to the advent of modern medicine, the emotional upheaval in battle was designated by lay terminology indicative of paralyzing fear or flight with the moral connotation of cowardice.

It has been only since World War I that military medicine has been called upon both to prevent and treat psychiatric casualties in an effort to better conserve the fighting strength. Because the largest fear and casualty producing agent was artillery fire, mental breakdown in battle became known as "shell-shock." This term, although descriptive, was unfortunate because it produced confusion and unclear thinking on the part of the patient and the physician. Medical officers debated amongst themselves as to the amount of brain damage present because of the inevitable history of a nearby explosion. Patients were easily influenced to believe then, as today, that their symptoms were a logical result of an outside force which caused irreparable injury to the mind. They readily took the view which removed personal responsibility for an emotional conflict. The entire syndrome was fostered and fixated by prolonged hospitalization with subsequent evacuation to the ZI. Following World War I, it became generally recognized that "shell-shock" was primarily a psychological problem, and that the effect of air blast upon the head could not explain most of the immediate symptoms and all of the later persistent illness.

At the outset of World War II, the pendulum had swung completely to the view that the emotional disruption of battle was an acute traumatic neurosis and should be classified accordingly. As a result, in the early phases of World War II, psychiatric casualties were designated as "psychoneurosis, anxiety state," "anxiety reaction," "psychoneurosis mixed," "conversion hysteria," etc. This nomenclature, like "shell-shock," proved to be misleading to the medical officer and traumatic to the patient. It unnecessarily conferred the diagnosis of a fixed neurotic disease upon a fluid and transient emotional disorder. Again, it influenced the psychiatric casualty to believe he was suffering from a serious mental illness for which there was a poor prognosis and in which he could readily utilize the secondary gain mechanism of illness to displace responsibility for his symptoms and behavior upon the workings of his unconscious mind.

Obviously, a new diagnostic category was needed. In 1943, the designation "combat exhaustion" was originated to convey a more realistic appreciation of a transient psychological breakdown caused by battle stress, which might occur in individuals with or without neurotic predisposition. The word "exhaustion" gave the connotation of a logical result of combat from which one can recover by such ordinary means as rest and recuperation. This diagnosis quickly became popular and was adopted by all branches of the service with such modifications as "combat fatigue," "flying fatigue" and "operational fatigue."

After the initial confusion of the Korean campaign, "combat exhaustion" became the standard diagnosis to categorize the acute psychiatric casualty among divisional or other troops in the forward areas. However, other definitions have already begun to creep in and distort the original meaning of the term. On the one hand, some have reverted to the past and regard combat exhaustion as a fancy name for being cowardly or yellow; on the other, it has become confused with physical exhaustion and considered an organic disease. It is the purpose of this paper to clarify the concept of combat exhaustion and to explain its complex etiology which may include physical factors. It is hoped that a bet-

ter understanding of the problem will point to logical methods of prevention and early treatment which are vitally necessary to conserve and salvage the fighting strength of our troops.

It has been stressed that the instinctive fear of the loss of one's life is the primary or basic cause of combat exhaustion. Yet this is too simplified a concept, similar to considering that the tubercle bacillus is the cause of the active disease. As in tuberculosis, it should be recognized that there are multiple causative factors, such as individual susceptibility to the disease, the amount and intensity of the dosage of the traumatic agent, and the lowering of sustaining powers against illness, called resistance. These are of far more importance in producing the clinical disease than the ubiquitous fear of death in battle, which, like the germ of tuberculosis, is present in almost everyone.

When attention is shifted from the threat to life as the major cause of combat exhaustion to an examination of individual susceptibility and the sustaining powers which prevent fear from overwhelming the person, a new way is opened for a more fruitful understanding of the entire problem.

In considering individual susceptibility to emotional breakdown, it must be conceded that all persons do not have the same capacity of adjustment to stressful situations. In combat it is particularly necessary that the soldier be able to mobilize and externalize aggression, in order to adequately cope with the enemy. The timid, passive person who has never had a fight and who rarely fires his rifle is especially vulnerable to fear because he is unable to discharge tension by hostile action. Consequently, anxiety builds up rapidly and becomes uncontrollable. To a lesser degree, the overly careful or overly aggressive individual is more susceptible to combat stress because such character traits have been developed as a protection against excessive inner feelings of insecurity and dependency. Continuous combat produces a collapse of the hitherto effective defenses of the individual with the consequent rise of unbearable tension.

Another component of the personality which contributes to the adjustment of the combat soldier is the conscience. This is that well-known internal policeman that forces one to perform unpleasant, distasteful and even dangerous tasks, because of duty, honor, self-esteem and self-respect. Individuals with an average degree of this conscience element are internally compelled to keep going on in battle despite terror and a wish to flee or be helpless. Self-esteem is a potent force in human behavior and is deeply ingrained in individuals of our western civilization. It is responsible for the phrase, "I have to live with myself." If the strength of the conscience is low, the soldier lacks an internal compelling agent and more readily allows himself to be overcome by external stress. If the conscience is overly severe, it punishes the person for even the unavoidable disastrous episodes so common in battle. This reaction is not infrequently observed in officers and non-commissioned officers who blame themselves for the normal vicissitudes and casualties among their men, despite the intellectual knowledge that such events are inevitable in combat. This feeling of guilt adds a further burden to the existing tension and may precipitate a mental breakdown.

The omnipresent fear of death and the individual susceptibility to combat stress are not sufficient to explain the causation in most cases of combat exhaustion. It is common knowledge that some combat units consistently have fewer psychiatric casualties than others, despite an equivalent or greater degree of battle stress. This discrepancy in psychiatric rates can be observed among the various units of a battalion, a regiment or a division. The distribution of vulnerable individuals is similar in all organizations and does not explain the disproportionate incidence of psychiatric breakdown. Another factor must be present. This can only be due to the influence of the group or combat unit which can offer realistic protection against external fear. The individual does not fight alone - around him are his buddies who share his dangers and deprivations and will aid him if he is disabled. The more confidence he has in his platoon or company the less fearful is the battle situation. When men fight together and share common tribulations, they become bound by the closest of emotional ties. This affection, which is akin to love, serves to lessen concern for one's own life, thereby decreasing the crippling subjective sensation of fear. That such an emotional bond is common has been repeatedly demonstrated by numerous instances where individuals have unhesitatingly performed dangerous and heroic deeds to save their friends. The grief reaction of a man who loses a buddy in combat is only comparable to the mourning over the loss of a loved one. The close kinship of man forged in battle is responsible for instances where soldiers prematurely leave the hospital or a rear assignment to rejoin their comrades.

Group identification begins in training. Here the soldier gains not only competence and confidence in the use of his weapons but also learns the value of team work in battle: the foundation for the protective functioning of the unit. Where additional training is given to the new replacement by the combat unit, it serves, rapidly and effectively, to integrate him into the group. Such a training policy for new replacements has been successfully adopted by divisional units in Korea when the tactical situation permitted. This acts as additional environmental support often needed by susceptible individuals to prevent an early breakdown in battle.

Even the timid soldier comes to feel secure by being in a powerful group and often assumes the aggressive attitude of the organization. The unwilling person with little internal compulsion for hazardous duty is literally forced to adopt the higher standards demanded by his fellow-soldiers. The combat unit develops its own special characteristics which are quickly adopted by the new replacement; after a short time he talks and acts like any veteran member. In brief, the group offers protection against fear to the soldier and provides for his emotional needs, but demands that he give up personal desires and selfish considerations. In its simplest form, group identification is a matter of "united we stand, divided we fall."

The ability of a combat unit to achieve tactical success and to sustain its constituents against emotional breakdown is entirely dependent upon its leader. Napoleon's dictum "there are no bad soldiers, only bad officers," points to the crux of the problem of morale and combat effectiveness. Because the company grade officer lives in intimate contact with his men he plays a vital role in their motivation and group spirit. This officer is fig-

uratively and literally a father figure. Like a good father he cannot be over-indulgent, but he must have a personal concern for the comfort and welfare of his men. Such a leader sets the standard and the motivation for his organization by example and behavior. The poor combat leader is quickly recognized by his men for inapt tactical management, unfair treatment, and a callous disregard for their comfort and safety.

A member of an adequately led combat unit has an increased resistance to mental breakdown because of the emotional and actual support provided by the group. The failure of such an environmental support is the major cause for most cases of combat exhaustion. It explains the difference in psychiatric rates for various units. However, there are exceptions even in a well-led combat unit when unavoidable battle episodes occur and heavy casualties are suffered. The protection of the group is suddenly weakened or destroyed. It is at this time that psychiatric casualties may occur from the more susceptible members of the unit when they are left to face their danger alone. There are also occasions when the death or other removal of a combat commander may cause a disruption of the group, with consequent mental breakdowns, especially if a new leader, a platoon sergeant, for example, does not arise promptly to assume command.

A minor but pertinent cause of combat exhaustion is a lowering of the physiological state of the body. This occurs when men go without food and sleep for many days, or may be produced by such intercurrent diseases as malaria, diarrhea, and hepatitis. A decrease in physical ability to function adequately makes it difficult for the soldier to continue his aggressive adaptation and to control subjective sensations of fear. If not corrected, it may operate as "the straw that broke the camel's back" in its action as a precipitating agent to produce combat exhaustion. Unit commanders are well aware of this problem and attempt to insure periodic rest from combat with an opportunity to obtain hot food and sleep. Often the unit commander and the battalion surgeon act together to give particular individuals a 24-hour rest period at the aid station or some other suitable location.

The prevention of combat exhaustion must lie in the province of command. The medical officer has no inoculation against the virus of fear; moreover, it is impossible to select only mature, aggressive and well-motivated men for combat duty. The measures that will sustain the soldier from an emotional breakdown are identical with those required for a good tactical unit. The selection of capable combat leaders and the initiation and maintenance of group morale and motivation are the logical and profitable means of preventing the soldier from being overcome by battle stress.

The prevention of psychiatric casualties is a relatively simple process compared to treatment after the individual has suffered a mental breakdown. This can be done effectively and rapidly when the causes of combat exhaustion are understood and if there is a proper appreciation of the role played by the primary and secondary gain in illness. The primary gain in illness is readily recognized when one considers that sickness confers a gain of being helpless with an honorable reason for not fulfilling adult obligations. This explains the euphoria of soldiers who receive a non-serious battle wound. It accounts for the phrase "million dollar wound" which in effect places the individual in a privileged status of being unavoidably

removed from the difficult and dangerous job of a combat soldier. It is only after recovery from such a wound, when the individual is ready for discharge from the hospital, that tension and anxiety appear coincident with the removal of the advantages of illness. Any type of disease may provide an element of primary gain for the patient. This is equally true in civilian life where sickness is the best excuse for remaining away from work or onerous tasks. The psychiatric casualty also achieves a primary gain from his illness. Hysterical blindness and paralysis on the battle field duplicate disabling conditions and force the environment to remove them from the stressful situation. It should be emphasized that in wounds, diseases and most cases of combat exhaustion, the primary gain in illness is unconscious and not sought for directly by the individual. However, when the soldier uses the same symptomatology to avoid return to combat or to prevent assignment to non-combat duty, we note the phenomenon of the secondary gain in illness. It is an attempt by the individual to retain his patient status by the utilization of a similar pattern that produced the primary gain. This is demonstrated by the wounded soldier who upon recovery continues to have pain about the site of injury or operation and the psychiatric casualty who maintains his tremor, headache and tension even though quite removed from battle. The longer that patient remains away from his unit, in time and distance, the more vulnerable does he become to the fixation of secondary gain. He is removed from the sustaining influence of his organization and is no longer motivated by their attitude and standards.

The awareness of the factors of time and distance in the gain in illness mechanism can be effectively utilized in the treatment of combat exhaustion particularly if that illness is viewed as a temporary disruption of the protective powers of the group or a lowering of resistance of combat stress by physical factors. In actual practice the acute psychiatric casualty is readily salvaged, if after a period of relief from mental and physical stress he is promptly returned to his organization. This return contains the emotional support required to aid him in resuming his previous self-control. A treatment program which involves a 2-4 day period of rest and rehabilitation within the division area has the advantage of keeping the patient near his group where time and distance is not sufficient to permit the transition from primary gain into chronic secondary gain habits. Severe cases of combat exhaustion however, must be evacuated to rear hospitals and

given a more prolonged relief from battle. This is especially true when individuals have been in combat for many months and have lost most of the members of their original group. At this rear level of treatment it is sound therapeutic management to return the patient to some useful non-combat job as soon as possible in order to circumvent the buildup of secondary gain symptoms, and to give the individual an opportunity to feel that he is still an effective member of the Army. After several months of a rear assignment, the former combat soldier often is ready to return to his original organization. Even the most serious cases that are evacuated to Japan are salvaged for effective non-combat duty by psychotherapy. This form of treatment insists that what has happened to the patient is a rational and logical series of events; that he cannot cling to the helpless state that originated in battle and that the overcoming of the neurotic mechanism is imperative to prevent a fixation of symptoms which would occur if he were returned to the ZI. Such further evacuation tends to place an additional burden upon the patient in that he must continue to have symptoms in order to explain to himself, his friends and family the reasons for his failure. If the pattern of secondary gain is repeated often enough the individual is rendered helpless for subsequent useful activity and there is produced the well-known querulous, irritable, neurotic war veteran.

What has been stated above in regard to the prevention and treatment of combat exhaustion can be applied with equal force to the emotional breakdowns in non-combat units whether they be located overseas or in the ZI. The factor of group identification which sustains the individual against the deprivations and vicissitudes of the environment operates in an identical manner in non-combat organizations. Here also, leadership is of equal importance in the maintenance of unit morale as it is in a combat organization. Similarly the treatment of psychiatric patients from non-combat units should be based on the principle of therapy near the location of origin, thus limiting the gain in illness.

Summary:

Combat exhaustion is due to multiple factors, the most important of which is a decrease of the environmental support provided by the group or combat unit, permitting the soldier to be over-whelmed by external danger. The recognition of this concept facilitates a more rational application of the methods that can be employed in the prevention and treatment of this disorder.

FIELD HOSPITAL NEUROPSYCHIATRIC SERVICE

Captain Harold Kolansky, MC; Captain Richard K. Cole, MC

The Neuropsychiatric Service of the 4th Field Hospital served as the main psychiatric treatment center for UN Forces in Korea during the months of November and December 1950, and for this reason a somewhat detailed report is herein presented. This service was established in early October and continued to function from that time forward, except for a nine day period from 15 - 24 December when the hospital was moved from Ascom City and relocated in Taegu, Korea.

This report will be considered from the following aspects:

- (1) Professional and other personnel assigned
- (2) Organization of wards
- (3) Types and relative numbers of cases
- (4) Types of interviews and treatments
- (5) Advantages of being part of a Field Hospital
- (6) Liaison with Division Psychiatrists
- (7) Days of hospitalization and dispositions

1. Professional and other personnel assigned:

When first organized, the service had one psychiatrist. It soon became apparent that one man could

not handle the volume of work and an additional psychiatrist was assigned. As the service became the main psychiatric center in this theater an additional psychiatrist was added to the staff, so that in the latter part of November and in December three were working at the hospital. It was found to be distinctly advantageous to have more than one psychiatrist, not only from the aspect of one man being overloaded with the work, but also because the more unusual cases could be discussed. In this way better care to this type of patient was afforded. The three medical officers doing psychiatry had all been in psychiatric residency (civilian and Army) before being called or recalled to active duty in this theater. Each also had some experience with psychiatric cases at Station Hospital echelon in Japan before coming to Korea. In addition a nurse was assigned to the service during October and November, but it was found to be an unnecessary luxury for the patients. The assignment of a nurse tended to play up the hospital atmosphere and increased the possibility of secondary gain from neurotic illness. Thus, in the month of December, no nurse was assigned to the service. Four enlisted men with varying periods of training in neuropsychiatric work were assigned to the service. During the peak hours two medical technicians were on duty, and during the later two periods of the day one medical technician was on duty. The medical technicians were responsible for the assignment of beds, insistence on shaving, showering and eating, administration of routine medications, and observations on sleep, eating and behavior of patients. The Chief Psychiatric Consultant for FEC made several visits to the service during the period of operation, and saw and discussed patients with psychiatrists. During these visits he also held consultations for the other services.

2. Organization of wards:

Both in Ascom City and in Taegu the wards of the Psychiatric Service were separate from the Medical and Surgical wards. This was felt to be necessary due to the so-called infectiousness of some psychologic symptoms. The psychiatrists had separate small offices in the same ward section. Beds used were army cots and patients made their own beds usually. Food was not served on the ward, all patients having been encouraged to go to the mess hall for meals. The wards were located in permanent type buildings and there was adequate heat. At no time were we limited in number of beds or in length of hospital stay. An attempt was made to segregate patients going to limited duty, full duty, and to Japan (evacuation). This, however, proved to be impractical due to the short period of hospitalization. In general, interviewing and treatment were carried on in the private offices. Consultations from the rest of the hospital were seen on the psychiatric service, except in those cases where patients were confined to bed, and of course in these instances the psychiatrist went to the patient.

3. Types of Cases seen:

It soon became apparent that the types of cases differed somewhat; while troops were engaged in active combat with the enemy there was an upswing in the number of moderate and severe anxiety reactions and in conversion reactions; while in the periods between combat there were slight decreases in the number of anxiety and conversion reactions. In their places other neurotic reactions, psychotic reactions, character disorders, and immaturity reactions were seen. The overall picture included approximately 70% neurotic reactions, 10% psychotic reactions, 12% character

disorders and immaturity reactions, 2.5% neurological diseases, and 5.5% no disease found (including very poorly motivated soldiers and normal combat reactions as described by Ranson). The average daily admissions varied considerably depending on numerous factors; including the tactical situation of the day, availability of transportation from the front, number of surgical casualties who had to be evacuated first and availability of holding beds for the Division Psychiatrists at clearing stations. In general there were 1-30 admissions daily, the usual number being 15-20. During the latter part of November 1950, when Chinese forces began an all-out push, the number of admissions on several days was between 50 and 90. It was noted that usually there was a 2-4 day lag between the time surgical casualties began to arrive and the time psychiatric casualties began to arrive during active combat. Anxiety reactions were by far the most frequent entities seen, with conversion reactions next in frequency.

It was soon learned that the symptomatology of the anxiety reactions was of little importance; it varied from patient to patient, but almost universally the conflict was very close to, if not at the level of consciousness. This conflict seemed always to involve directly the combat situations and the dangers to the individual inherent to this situation. As will be mentioned below under the discussions of interviews and therapy, the therapist could quickly "peel away" the symptom layer, and could discuss directly with the patient the conflict of which the patient was at least partly aware. In some perfectionistic, compulsive individuals defenses would quickly break down under the conditions of battle which did not lend themselves to perfectionism, and these individuals would then develop a tremendous amount of anxiety. But in general the anxiety reaction was seen in individuals who were not of necessity compulsive, and who had been exposed to a considerable amount of combat. The backgrounds and family life of these individuals varied considerably and we can report nothing conclusive in regard to this at this time although we are attempting to study this.

The severe anxiety reaction was usually found in an individual who had considerable combat in this campaign (and sometimes in World War II as well). He would usually come in looking markedly fatigued with face drawn and expressionless or full of terror. Tremulousness, voice difficulty, dilated pupils, rapid pulse, profuse sweating tremors, and sometimes tearfulness were seen. The subjective complaints usually included insomnia, anorexia, more than the usual weight loss and battle dreams (which seemed always to be attempts at mastery of a situation in which the individual felt he had failed). Usually there is an immediate precipitating factor which assumes great importance in such individuals, such as the death of a friend with whom he has gone through numerous fire fights, or the inability to remove one of the wounded of his platoon while under fire. Usually the neurotic symptoms do not appear till after the individual is removed from danger. This protective mechanism has been noted in the other psychiatric syndromes as well.

The less severe anxiety reactions are somewhat similar in symptomatology, but symptoms are not severe and frequently the individual has just gone into combat for the first time although he may have been in Korea for some time previously.

In the perfectionistic officer or soldier, when the psychologic defenses break, depression frequently becomes part of the anxiety picture. Typical of this

type of reaction was a 25-year-old platoon leader (1st Lt.). This patient came in with marked apathy, anorexia, psychomotor retardation and constipation. He said: "War is hateful, useless, terrible - I'd like to evacuate my whole platoon. Poor boys, I'm a misfit; I could have taken one of my wounded out, but I couldn't because of the shooting. He died. I'm no officer!" The history of this patient revealed that he had straight "A's" in college, had been an excellent infantry lecturer, had been a pride to his outfit in the United States and had done very well on maneuvers. When he finally became a platoon leader after three months in Korea, the difficulties of combat broke down his defenses and his punishing superego took over, with resultant severe anxiety symptoms and depression.

Conversion reactions as well as anxiety reactions almost always developed after the danger had passed. Many gross hysterical phenomena including total paralysis of both lower extremities, blindness, deafness or amnesia were seen and all patients seemed to have a moderate to a great amount of indifference to their symptoms. These seemed to occur frequently in passive individuals after the first show of hostility by such individuals. Typical of this was a 20 year old Pfc who came into the hospital after being treated for an upper respiratory infection for one month because of inability to talk above a whisper. This individual revealed under amytal that just prior to the development of aphonia he had killed some enemy soldiers (for the first time) while on temporary duty with a rifle company. This apparently disorganized his passive defenses, allowing a conflict to break through with resultant aphonia. This patient was quite passive and said, "I always walk away when I'm angry; that's best."

Surprisingly, a large number of the psychotic reactions seen were in base troops or troops who had been in Korea but a short time. The symptoms were those of the usual psychotic reactions as seen elsewhere. Minimal stress in these cases either accentuated already existing psychoses or tended to push the markedly regressed individual into psychosis. A 26-year old private who had been in Korea two weeks came into the hospital because "I have to go to the latrine often at night to urinate." It turned out that this individual had been responding to auditory hallucinations rather than urinary urgency. The voice was usually that of his grandmother, long since dead. This individual had been raised by a domineering mother and a passive father who never allowed him to date or go out of town. He'd been rejected by the draft board in World War II on several occasions, and had made fair adjustment in a box factory for several years. He then had made a marginal adjustment during a year of active duty in the Army in the ZI. After going to Korea, he developed intense fear and "heard many strange voices on shipboard due to my seasickness." On admission the patient had flat affect, silly laughter, auditory hallucinations, irrelevancy and withdrawal from others on the ward. He was diagnosed as schizophrenic reaction.

Among the group labeled "No disease found" were several with the normal combat reaction (Ranson). These showed minor sleep difficulties at the front, tremulousness, anorexia, apprehension and other symptoms. When these patients were acquainted with the

fact that most of their buddies had these symptoms they were relieved, and after a good night of sleep were quite willing to return to combat. Also in this group were patients with one or more subjective complaints and almost no anxiety. Typical of such individuals was a 22 year old aidman who complained of "night blindness." When questioned, it appeared that he could not see in the field when the moon was out of phase and flashlights were not allowed. Other than mild myopia, the patient's eyes were normal. He'd lived in Boston most of his life and had no occasion to walk around without light and was never particularly aware of the difference in ability to see at night without lights when the moon was in different phases. He could see perfectly well in the field with a flashlight, or when the moon was full. He was introduced to these factors, and being a well-motivated soldier, he soon went back to duty.

Being at an Army level, in addition to getting patients from division clearing stations which were the usual sources of patients, the service also received patients from base units. Many of these were character-disorders, and all were returned to their outfits for administrative handling, rather than bog down the medical channels with such individuals.

4. Types of Interview and Treatment:

Each patient was seen on his first hospital day and each day of hospitalization by his own psychiatrist. Usually only one psychiatrist saw the patient, but sometimes he was seen by two. Usually during the initial interview (which lasted 15 to 30 minutes) the psychiatrist would listen to the patient's history and after this was obtained, the doctor would attempt to have the patient disclose quickly the conflict by questioning which was directed toward the minimizing of subjective complaints. Once the veneer of symptomatology was removed one could discuss with the patient his actual fears of combat, anger at a superior or feeling of inability to do a job for which he may not have been too well suited. Great emphasis was placed in this form of brief, directive psychotherapy upon the current situation rather than upon an often unreliable past history (which patients frequently exaggerated to make it appear that they had a lifelong neurosis). This type of therapy, drawing forth the feeling of the patient in relation to current events, was carried on the following day or two of hospitalization. With this treatment, anxiety frequently lessened or disappeared as the patient began to understand what he was really concerned about. This therapy was effective at this level because rapid evacuation inhibited a complete establishment of the neurosis. The conversion reactions were treated by means of strong suggestion, or abreaction usually under amytal narcoticsynthesis. Coramine in large doses was used to a great extent following amytal, in an attempt to have the patient wake rapidly following the abreaction. We were not overly impressed with the use of coramine over the non-use of coramine. Almost all conversion reactions became asymptomatic under this form of treatment and most could at least be returned to non-combat duty if not combat duty. It was interesting to note that when the defense of conversion was removed thus, almost all patients, rather than becoming gratified at being able to walk or see, would become extremely hostile toward the thera-

pist. This would usually pass off before the patients returned to duty or would at least become lessened. Included in treatment was a routine insistence on cleaning up, shaving, and eating within the first 6 to 12 hours. With severe anxiety reactions and psychotics, amylal sedation was used the first night starting with 6 grains and with repeat amounts until enough had been given to insure restful sleep. (In general, sedation was used sparingly and was never routinely ordered.) Frequently a moderate anxiety reaction looked much improved after the patient merely cleaned up and had a good night of sleep. Brief outpatient psychotherapy was attempted with several patients from base units. The accentuation in interview and therapy was always on the current situation in combat and what was happening in the interpersonal relationship between patient and doctor. The patient was not allowed to use the cloak of symptoms without exploration of the conflict. We are much encouraged by our results using this form of psychotherapy.

5. Advantage of being part of a Field Hospital:

Having a main treatment center operate as part of a Field Hospital in a combat theater was different from the usually independent psychiatric treatment centers of World War II. Its advantages were many to the hospital staff and to the patients on the other wards. By so operating, liaison with the medical and surgical services was gradually established so that numerous consultations were being sent to the psychiatrists -- the usual number being 5-9 per day but often being as many as 12. In addition, there were always consultations from outside units. Some of the "mysticism" frequently cloaking psychiatric work in the minds of other doctors was removed by having psychiatric patients on their own wards whose problems they were able to discuss at liberty with the psychiatrists. It is felt that teaching the principles of psychiatry and psychosomatic medicine to the medical officers on the other services was both an appreciated as well as an important function of this psychiatric service. The importance of situational and psychogenic factors in causation of illness was thus seen by the other medical men through consultations on their own patients. It was felt that as a result of this liaison, the other medical men developed greater facility in diagnosing, handling, and returning to duty those on their own services who had psychologic factors in their illness.

Numerous unofficial conferences were held in relation to psychogenic factors in illness between the other medical officers and the psychiatrists. An indication of the awareness of psychogenic factors in illness by the other medical officers was the fact that well over 150 consultations were held in

the month of December. We became well aware of the fact that admission of patients to a psychiatric treatment center in no way reflected the large incidence of disease of psychologic origin, for the medical and surgical services saw large numbers of self-inflicted wounds, syndrome of cold feet, gastrointestinal reactions and other psychosomatic diseases.

6. Liaison with Division Psychiatrists:

Almost all psychiatrists in Korea were known to one another, and the Division Psychiatrists would occasionally come to the 4th Field Hospital where mutual psychiatric problems could be discussed. In this way those of us on the Psychiatric Service at the 4th Field Hospital knew and appreciated some of the problems and difficulties of the Division Psychiatrists. For example, some of the Division Psychiatrists at times had a very difficult time obtaining sufficient holding beds in clearing stations. We were aware of increased admission rates from divisions at these times. This of course played a part in our record for returning large numbers of patients to duty. If the Division Psychiatrists had been able to hold patients longer in some instances they would have been able to return them to duty before they reached this level. A certain number of patients obviously evacuated for psychiatric reasons, but who were tagged with medical or surgical diagnoses by battalion surgeons to prevent their being seen by Division Psychiatrists, were picked up on medical or surgical wards.

7. Days of Hospitalization and Disposition:

The average hospital stay of patients was 2 to 3 days. Some 65% to 70% of patients were returned to duty, of which about 40% to 50% went to full duty and the rest to limited duty. Some 10% went to Pusan or to a hospital ship during early December when the situation was so fluid that the hospital days were reduced to one. Any patients needing more than this were evacuated -- about 20-25% to Japan. It is felt that among the factors influencing the large number of returns to duty as compared to those in World War II is the fact that although the treatment center was often 200 miles from the front, the rapidity of transportation by air was such that there was no long slow trip back to a treatment center behind the division clearing stations. This time could have been adequate for the fixing of some symptoms. Also since the discomforts are inherent to all parts of Korean, combat area or not, secondary gain factors are lessened. Lastly, it is felt that the shortened stay of 2-3 days decreases the time during which secondary gain might develop.

MEDICAL EVACUATION AND THE GAIN IN ILLNESS

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The fact that illness often represents a gain for the individual seems paradoxical since disease is generally considered as a disaster or at least a painful, crippling episode. The pain, discomfort, restriction of activity, and possible danger to life has always made man fearful of disease and its consequences. To obtain security from this threat there have been steady strides in the prevention and treatment of all types of disease. However, doctors of medicine are

quite aware that illness is often utilized by the individual as an honorable escape from disagreeable tasks or onerous obligations. In the psychiatric field hysterical patients develop such syndromes as extremity paralysis, blindness, and deafness which mimic bodily disease and are the result of an unconscious attempt by the individual to solve an emotional conflict by the compromise of disease.

Man, in common with the other animal species, obeys the biological principle of avoiding pain and displeasure while striving for gratification and pleasure. Pleasure is used here as a general term to include personal security, shelter, food, satisfaction of sexual needs, and the gratification of ambition and achievement. Displeasure comprises physical danger and pain, thirst, hunger, and frustration in career and work. It is important to note that while all human beings follow the pleasure-pain principle, in many instances pleasure and displeasure become relative matters depending upon the individual and the culture in which he is raised. The Chinese soldier does not experience as much displeasure as the American soldier in withstanding the deprivation of food, shelter, and the discomforts of the field. Some Americans cannot even tolerate separation from their wives or mothers and experience so much displeasure that they become literally sick and ineffective.

At this point it is pertinent to examine the American culture and note the role that illness plays. Generally our children and adolescents are carefully protected against physical harm, pain, and discomfort. Their aggressiveness is curtailed because it may lead to injury or harm to others. Yet we also teach and stress courage, initiative and aggressiveness, particularly in career and ambition. To put this more simply, our culture overly protects the young while at the same time exhorting him ideologically to be aggressive, bold, and ambitious. The result is that frequently the adolescent male is relatively helpless and fearful when faced with physical hazards but in his day dream fantasies he is an all-conquering hero similar to what is portrayed on the screen and in the comic books. This type of adjustment is adequate for the adolescent but as an adult and more specifically as a combat soldier he has to perform hazardous duty, withstand severe physical discomfort, and be aggressive enough to destroy the enemy. For many of our combat soldiers this change or adjustment is difficult and in some cases impossible.

To this problem of the adjustment of the combat soldier illness and injury comes as an honorable compromise which brings back the childhood protection and care and yet relieves him of the obligation which is demanded of him as an adult and a combat soldier. The advantages of illness do not come as a surprise to the soldier. In childhood he could not have failed to note the increase in love and affection from his environment that regularly accompanied episodes of illness. He knew that illness was the major cause for being excused from school or other daily and sometimes disagreeable obligations. In peacetime and in garrison duty, illness again was the only method of being excused from strenuous or disagreeable tasks. The sick call line is large when a long march is ordered but melts away when holiday leaves are being granted.

The combat situation with its stresses and hazards crystallizes the pleasure-pain principle. It is not unnatural for the combat soldier to watch with envy the evacuation of his lightly wounded or injured buddy. The term, "million dollar wound" has become part of his vocabulary. Literally he is stating that a non-serious wound is worth a million dollars to the individual. The euphoria of the wounded soldier is a common observation. It extends to the even more seriously wounded who have been relieved of pain. It is not surprising or unnatural for the combat soldier to have wishes in this direction, conscious or unconscious, which affect his motivation in connection with the seeking of medical evacuation for disease or injury. This is directly reflected

in the phenomena of SIW, (self-inflicted wounds), and other careless accidents which increase with the hazards of combat. It is also demonstrated in the large number of broken spectacles and dentures which cause at least a temporary removal from battle. More numerous than the foregoing are other non-battle casualties who are evacuated from the combat situation. Many of those cases have mild medical and surgical conditions or no objective findings but only subjective complaints.

The combat psychiatric casualty breaks down and admits that he cannot stand the continuous stress of battle. The mild non-battle casualty has a similar difficulty but tries to avoid an internal conflict with his own conscience by placing the cause of his inability to perform to physical factors which are not his responsibility and beyond his ability to control.

Once an illness or injury, regardless of cause or severity, has removed the individual from battle the gain incident to such removal becomes a factor which often acts to prevent a return to combat duty. His gain in illness becomes more fixed dependent upon the distance and length of time he is away from the combat area. The current rapid, efficient air evacuation is a splendid and commendable advance in field medicine, but for the mild medical and surgical case the gain in illness mechanism is increased. It becomes more difficult to return such patients to duty and the individual is lost to his unit for an amount of time disproportionate to the severity of his condition.

In the hospital it is common to find patients clinging desperately to symptomatology in an effort to keep the gain which has resulted from the disease or injury. Complaints of headache, backache, weakness, painful joints and scars are frequently resistant to treatment. Such patients often are resentful. They claim nothing is being done for them and indignantly deny that they are trying to avoid duty, but rather stress that their pain or discomfort makes it impossible for them to keep up or perform strenuous physical exertion. Such statements as, "Cure my back and I'll be glad to go up there", or "I'm no good to them if I can't keep up", are common. Physiological and psychological explanations are usually wasted as the individual usually insists that he has his pain and "doesn't imagine it".

What should be the role of the medical officer in handling this drive to escape a difficult situation via medical channels. If the medical officer stationed in battalion or regiment yields to subjective complaints or non-disabling conditions and evacuates such individuals he only creates loose medical discipline and a larger number of soldiers are stimulated to try the medical escape route. The medical officer is also affected by the situation. If he endures combat hardship it is human to identify with the soldier, actually feel with him, his dilemma, and be subconsciously influenced to accept subjective complaints as valid criteria for evacuation. In a rear position or hospital the medical officer often feels guilty when returning individuals to a more dangerous environment than he fortunately does not have to endure. Medical officers often try to solve their own dilemma by resorting to rationalizations, sometimes quite true, that they cannot hold patients and study their cases thoroughly, that he does not have laboratory and other diagnostic facilities to disprove the patient's complaints, and that the next hospital has more time and facilities. In so doing the medical evacuation is either initiated or con-

timed and with each hospital being crowded the patient is moved along with a consequent increase in the gain in illness as he is efficiently moved further to the rear. In the rear hospital in Japan the medical officer has to contend with the gain in illness strengthened by time and distance. The soldier cured of his flesh wound, mild fracture, minimum frostbite, diarrhea, or febrile episode begins to develop symptoms with the healing of his disease or injury. It is also influenced by further possible gain as he watches the seriously ill and injured cases being sent to the ZI.

There is no easy answer to this problem which is so deeply rooted in basic biological demands. It is particularly difficult for the medical officer because his training conditions him to sympathize with suffering and to be persistent in the removal of the symptoms of his patients. The medical doctor likes to have satisfied and grateful patients, to be personally liked and complimented. Yet to perpetuate and be influenced by the gain in illness is to do poor medicine, to stimulate others to avoid their obligations and to be ineffective in the mission of the Army Medical Service which has for its purpose the conservation of the fighting strength of the Armed Forces.

The only effective and reasonable solution for the medical officer in this difficult matter is to be a medical doctor and to rely on his specialized medical knowledge. He cannot let himself be influenced by his emotional feeling of who should or should not be sent to combat duty. The medical officer is not an expert on justice, military strategy, or geopolitics. He is a soldier equipped with a specialized technical skill to do the job for which he is assigned. Regardless of where the medical officer is stationed his

function is clear and unequivocal. Patients must be reasonably examined and evaluated. If the individual is disabled for duty and requires further treatment not possible at the particular time or level in which he is operating then medical evacuation is indicated. But if the soldier has no objective findings and only subjective complaints he is not disabled and must be promptly and firmly returned to his unit. Acrimonious disputes with the patient and long explanations are of little value. Becoming angry at the patient or tearful with him does not help anyone. The soldier should not be told to "try it again and see your battalion surgeon if you have any trouble", because this implies doubt on the part of the medical officer and confirms patient belief that his symptoms are valid. In most instances the medical officer can trust his clinical judgment. Unnecessary and elaborate diagnostic surveys serve only the purpose of allaying the anxiety of the doctor when he tries to disprove all of the patient's symptoms. If there is a reasonable doubt in the mind of the medical officer diagnostic procedures are indicated and valid, but this should be a clinical impression and not stem from the emotional insecurity of the medical officer. It is only by the use of a fair, reasonable and objective clinical approach that the medical officer can best perform his role in what is admittedly a difficult time for all. The unwillingness of a soldier to return to combat duty is quite understandable but this is not a professional matter for the doctor to enforce and properly falls under the function of Command. It is pertinent to reiterate that the medical officer is not actually the arbiter of the fate or destiny of the soldier. He is only a technical expert whose function is the evaluation, management, and treatment of disabilities resulting from mental and physical disease or injury.

PSYCHIATRIC TREATMENT IN THE ENVIRONMENT OF AN OVERSEAS CONVALESCENT HOSPITAL
Lt (Jg) Richard S. Blacher, MC

The purpose of this report is to demonstrate the advantages of the atmosphere of a convalescent hospital for the treatment and management of ambulatory psychiatric patients as compared with the environment of a fixed hospital installation.

One of the more difficult problems facing the military psychiatrist in wartime is the phenomena of secondary gain in illness. A rapid return to duty of psychiatric casualties from treatment units close to the front has mitigated a large part of this problem. There remains, however, the individual who is evacuated from Korea to Japan and who, having achieved such success by sickness, confronts the physician with a difficult therapeutic task. For the patient, whether he had been an excellent soldier, or one poorly motivated, having been removed from a situation fraught with real danger, is unwilling to be returned.

It has been shown repeatedly that the further to the rear a psychiatric casualty is evacuated, the smaller becomes the chance of returning him to combat duty. The longer he remains in the safety of a fixed hospital surrounded by the comforts of good food and a comfortable bed, the weaker become his ties with his comrades and his desire to get well.

The fixation of illness can be limited and averted by reassignment to non-combat duty, but the neurotic soldier who is in a hospital surrounded by more seri-

ously ill patients, many of whom are being evacuated daily to the ZI, may unconsciously or consciously feel that this is a poor compromise. At first glance the return of patients to non-combat duty may seem to be a small objective, for in wartime, combat troops are needed; the rehabilitation of soldiers for limited assignment would seem to be a less desirable goal. It must be remembered, however, that we are concerned with that psychiatric casualty who, having been screened by the division psychiatrist and the psychiatrist at an Eighth Army hospital, has been evacuated from Korea to Japan and has been diagnosed, temporarily at least, as being unsalvageable for combat. Later, however, as many as one third of even such patients may be restored to combat duty after several months of a non-combat assignment.

In order to provide a more realistic environment for the treatment of psychiatric patients sent to Japan, a psychiatric section was established in December 1950 at Camp Oniya, a convalescent hospital about 20 miles from Tokyo. This unit, a 900-bed installation, received from neighboring hospitals, patients convalescing from wounds and disease who required only physical reconditioning before being returned to Korea. The convalescent hospital provided a comfortable but not luxurious environment; nurses were not present. During the day there was a program of physical exercises, supervised sports, military drills and marches. Recreational activities were limited to the evening hours. Here, life was more comparable to that of one

in a military unit and made illness less gain-producing.

The previous use of convalescent centers for psychiatric patients had been limited by segregation and the establishment of a separate program. At Omiya, the psychiatric patients were mixed completely in all respects with the wounded and sick convalescent soldiers.

On admission to the hospital, each patient was given a clothing issue in place of hospital garb and assigned to a barracks unit. Following a physical examination by the ward doctor he was assigned to a group for graded exercises on the basis of his physical ability. He was then interviewed by the psychiatrist who discussed his symptoms and problems with him and explained the program to be followed at Omiya.

An attempt was made in the initial interview to classify patients along two general lines: (1) Those who because of unresolved internal conflict required psychotherapy and (2) those poorly motivated soldiers in whom secondary gain was the main problem and whose condition would benefit most from the environmental pressure of the convalescent center. In the second group, special emphasis was placed on two factors: under no circumstances would the patient be transferred from Omiya until ready for duty and that evacuation to the ZI was an impossible goal. This was confirmed by an atmosphere in which all patients were seemingly being prepared for combat duty, as compared to that of a fixed hospital from which some patients were daily being returned to the ZI.

The necessity for the return of patients to duty at the Japan level is based on the needs of the service which requires manpower for non-combat assignments and for the eventual rehabilitation of the patient. From the patient's point of view, lessening the gain from neurotic symptoms will interrupt a pattern of avoiding life's vicissitudes by the use of an ineffectual defense of helplessness. Illness had already demonstrated its value to the individual. If continued, there would be fostered a repetitive pattern of neurotic evasion whenever he would be confronted with an undesirable task. In effect, a determined treatment program at this level militates against the later development of a chronic neurosis.

The advantages of the treatment and management in the type of environment established at Camp Omiya became evident almost immediately. Benefits were not limited to the psychiatric patients only, but extended to those convalescing from wounds and disease. The problems of the medical officer were lessened; he was not concerned with bed shortages since his patients were not occupying facilities needed for acute or seriously ill casualties. The training and reconditioning program supervised by non-medical officers gave objective evidence of an individual's duty capabilities. The physical activity of the patient was steadily increased to a point that would be expected on a full duty status. If the patient could participate fully in the program there was no doubt of his ability to perform his job adequately from the physical standpoint.

Since it had been made clear to the psychiatric patient that he would not be transferred to another hospital for treatment and since this was a hospital, the frequent request, "I'm sick - send me to a hospital", was easily countered. Omiya had the advantages both of the realistic environment of a military post and that of a medical facility. Thus a

patient could be treated as if he were an outpatient while still in a hospital. Some men were assigned work during their hospital stay and could, while still protected to some extent, prove to themselves that they were capable of productive duty.

Some patients with only incomplete removal of such disabling conversion symptoms as lameness, headache, backache, would curiously insist upon being discharged to duty even though it was apparent that their symptoms were not alleviated. It was readily recognized that this attitude of the patient did several things for him. Firstly, he was attempting to avoid the disagreeable reconditioning routine. Secondly, he was preserving his gain in illness to be used as soon as possible after return to duty for another attempt at evacuation. Since this could not be accomplished at Omiya, perhaps he could try somewhere else. Thirdly, it was a form of hostility against the doctor and would give credence to the oft-repeated remark by patients that "they did nothing for me." Such a situation was handled by insisting that the patient could not leave the hospital until he lost all overt signs of disability. It was of the utmost importance to demonstrate to the patient that his symptoms were not disabling in nature, and that he could perform duty.

In this atmosphere, the patient's theme changed to, "if I stay sick, I will have to stay here; if I get well I can get out and return to duty, which will probably be better than this." This reasoning was facilitated by the knowledge that he will be recommended for a non-combat assignment and reinforced by the fact that he is surrounded by men who are returning to combat. This makes it difficult for him to gain sympathy from others or to indulge in self-pity. Treatment is directed toward insisting that the patient is still an adult with the obligations of a soldier and although he may struggle against this concept, it is soon realized that his neurotic illness can be more of a handicap than a help. At this point he becomes amenable to psychiatric treatment which previously he had rejected as a threat. In the poorly motivated individual, the environmental pressure is the strongest therapeutic tool.

This type of therapeutic regime is especially effective in the management of individuals who have been evacuated from Korea for suspected organic disease because of somatic symptoms. These concealed psychiatric casualties insist that they have an organic illness and stubbornly resist the therapeutic efforts of the medical officer. Often their attitude is hostile and resentful as they desperately try to maintain their gain of illness which has successfully removed them from combat. A typical case of this type is described.

CASE HISTORY:

H.O., a 30-year old white corporal, with 9 years of service in the Army and four months of combat in Korea was evacuated on 3 January 1951 because of a sudden onset of aches and pains in the back, legs, and knees. He was evaluated on the medical service of a fixed hospital where all findings were essentially within normal limits. However, the patient insisted he could not walk because of extremity pain. A psychiatric consultation resulted in a diagnosis of conversion hysteria and by the use of intravenous amytal the patient was able to walk without difficulty. After the amytal interview he promptly reverted to his former incapacitated state. Despite a promise of non-combat duty, he continued a steady

downhill course for two weeks, and on 1 February he was transferred to Camp Omiya.

He was assured that he would not be sent home but would be kept at Omiya until ready for duty. The patient protested that the cold weather would prevent his recovery, since a similar episode had occurred during the winter of 1944 while he was in combat in Europe. Only after he had returned to the warm climate near his home had his legs improved. Psychotherapy was futile. The patient was placed on leg exercises, drills, and the routine reconditioning program. In ten days his walking had improved somewhat. He became quite anxious to leave the hospital but was told that he could go only when he had fully recovered. In five more days his gait was normal and discharge to non-combat duty was effected. As with other unwilling soldiers, he was informed that if he were rehospitalized, the next doctor might well take him off the non-combat status and return him to full duty. It was therefore to his advantage to stay well.

Not only the poorly motivated soldier, but the good soldier, benefited from the non-hospital atmosphere at Omiya. This is illustrated by the following case.

CASE HISTORY:

N.F., a 39-year old Master Sergeant was evacuated after seven months of combat as a platoon sergeant because of vomiting, diarrhea and abdominal pain. Medical investigation revealed no abnormal findings. In 1942 he had had hepatitis and from that time on had been subject to occasional gastrointestinal upsets. His Army career had begun in 1942; during World War II he had served 22 months in combat in the South Pacific as an infantry lieutenant. He was discharged in 1946 and worked at several jobs as a credit manager, but quit them because of either low pay or because he felt that was "too much mental strain." He had difficulty finding further employment because of his age and returned to the Service in 1949 as a master sergeant because he was over age at that time for his commission. He had been married 8 years to a motherly type of woman.

He showed only slight improvement in his symptoms while in a general hospital and was transferred to Omiya. In early interviews his passivity became very apparent. He cried bitterly as he described his attempts to take care of "my kids" in the platoon; his struggles to keep up with them physically, and how lonely he felt. Despite his passivity, he had managed to assume much responsibility, but when he was evacuated this defense broke down completely and he reverted to his need for dependency and surrendered himself to being taken care of by others.

He discussed his homesickness frankly and after a short while he had good insight into his difficulty. In addition to the routine program, it was arranged to assign him to a job which while small, was accompanied by some responsibility, and he soon regained interest in working and his symptoms ceased. Despite this individual's good motivation, the temptation to "give up" while in a hospital was too great. Being treated as an adult and a soldier made it impossible for him to continue a helpless adaptation.

The control of secondary gain was less difficult when casualties were admitted directly from Korea without prior hospitalization on a medical or psychiatric service of a fixed installation. This is illustrated by the following case histories.

CASE HISTORY:

F. A., a 26-year old SFC was evacuated from Korea after 10 months of combat because of severe anxiety and depression. He had been wounded twice and on his second return from the hospital he remained with his combat unit for a week with increasing tremors, tension, crying and ineffectiveness. Prior to the second wound he had consulted the battalion surgeon for "nervousness" but was returned to duty as a platoon sergeant.

On admission to Omiya he sat trembling, crying and staring at the floor. He spoke only with great difficulty, and expressed concern over his sanity. For two days he was allowed to rest, but then despite his tenseness, he was placed in a reconditioning group. He gradually improved and became coherent and could verbalize. His background revealed a good previous adjustment. He did well in the early months of combat and was promoted from corporal to SFC. He described increasing tension during the last month of battle, "you're always fighting two wars, one with the enemy and one with yourself. You finally reach a point where you can't go on." He was assured he would not return to combat, but neither would he be evacuated further. Within two weeks, his tenseness gradually disappeared, he began eating and sleeping well and was returned to non-combat duty.

CASE HISTORY:

A 32-year old sergeant in the combat engineers was evacuated from Korea after 3 months with the diagnosis of conversion reaction manifested by pain in the right shoulder and paralysis of the arm. Before evacuation, physical examination by an orthopedic consultant was negative and x-rays and laboratory procedures did not reveal any evidence of organic disease.

His past history revealed that following a jeep accident in 1942 he had had repeated episodes of a similar nature both in the Army and in civilian life. Every time he would meet with a difficult situation he would develop shoulder pain and thus remove himself from the unpleasant predicament. His childhood was punctuated by family discord and insecurity and he reflected this in his marked feeling of dependency.

Any suggestion that his symptoms were psychogenic was resisted and psychiatric help refused. He was placed on the program of marches and drill and was, in addition, given arm exercises. Assurance was given that there would be no further evacuation, despite his complaints that Omiya was no place for a man in his condition.

After several weeks, amytal was given intravenously with complete removal of pain. The interview material revealed more strikingly his marked need for dependency and inability to reconcile his own personality with his ego ideal. After the sedative effect of amytal decreased, he reverted to his incapacitated condition.

Over a period of several weeks his complaining increased, but the arm weakness and pain subsided and in five weeks he was discharged to non-combat duty.

After the observation and treatment of 50 such direct admissions, the clinical impression was in keeping with what might be expected when the gain in illness was not stimulated by residence in a fixed

hospital atmosphere. To most of these direct evacuees, Omiya seemed like a paradise when compared to living conditions in Korea. This attitude was in marked contrast to cases transferred from hospitals in Japan who invariably felt that Omiya was miserable and uncomfortable.

Since no one from Omiya was evacuated to the ZI such a possibility was not suggested to the direct admission from Korea. Thus, having received treatment in an atmosphere which resembled a duty environment, he was less reluctant and could readily accept his return to duty status. On the other hand, the patient who had been previously hospitalized in a station or general hospital has a constant reminder that evacuation to the ZI is possible which operates to continue symptomatology with a resultant refusal to accept a return to duty status.

While a statistical comparison of the efficacy of different treatment milieu is a difficult task, it is pertinent to note that during a four month period the length of hospitalization for psychiatric casualties admitted directly to Omiya averaged 10 days.

BRIEF PSYCHOTHERAPY OF THE WAR NEUROSES

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Much has been written of the various psychiatric casualties encountered in an overseas theater of operations in wartime. The description of the casualties has been ample; statistics have been compiled showing the relative proportion of each category. Occasionally, old categories are replaced by new ones. The terms "shell-shock", "combat exhaustion", "operational fatigue", etc., have all had their popular day. The various echelons of evacuation and treatment have been standardized in a most efficient manner. However, it seems that an outline of the therapy used, its philosophy, its goals and its successes, begs for description.

The Army divides, for classification purposes, psychiatric disorders into the following groupings:

- a. Psychotic Disorders - e.g., Schizophrenic reaction.
- b. Psychiatric Disorders with demonstrable physical etiology or associated structural changes in the brain - e.g., Paresis.
- c. Psychoneurotic Disorders - e.g., Dissociative reaction.
- d. Character and Behavior Disorders - e.g., Passive-aggressive reaction.
- e. Disorders of intelligence - e.g., mental deficiency.
- f. Transient personality disorders - due to acute or special stress - e.g., combat exhaustion.

These categories are essentially consistent with the prevalent concepts of modern psychiatry and have proved their usefulness during World War II and the present period.

The remarks to follow concern themselves with groups c, d and f. It must be borne in mind that what is outlined below is an empirical approach which under-

For the same period, the average hospital stay for an equivalent number of men returned to duty from the 361st Station Hospital, the Neuropsychiatric Center in Tokyo, was about 17 days. It is felt that this comparison supports the contention that the environment of a convalescent hospital is more effective for the treatment of ambulatory psychiatric combat casualties than the atmosphere of a fixed hospital.

SUMMARY:

This report discusses the value of a convalescent hospital atmosphere in the treatment of ambulatory psychiatric patients. It is emphasized that the reconditioning and duty atmosphere inherent in the convalescent program provide a deterrent to the secondary gain of illness.

Case histories are presented to indicate the various mechanisms and attitudes of the patients as they cling to the defensive symptoms. Psychiatric treatment is greatly facilitated when it is demonstrated to the patient that his symptoms can no longer gain for him a tangible benefit.

went numerous modifications and revisions in order to meet and accommodate itself to the changing situation. The flow of casualties varied from day to day with the patient load at any one treatment facility rising and falling with the tide of battle. The pressure of time upon the psychiatrist was normally intense, often pushing. But throughout, the extreme need for the quick salvage of manpower remained constant. It was with such need in mind that brief psychotherapy, of necessity, came into prominence.

The parts played by the division psychiatrist, and the hospital psychiatrist in Korea in the handling of the psychiatric casualty has been described elsewhere. The concern here is with the setting in a convalescent-rehabilitation center for it is here that it is believed the best brief psychotherapy can occur. The exact location of such a unit is best in a communications zone but need not necessarily be so located if military policy contraindicates. Though for military purposes such a center is called a hospital, it functions with a minimum of hospital personnel. Nurses, luxurious appointments, the hospital atmosphere, and white-garbed attendants are all conspicuous by their total absence. The geographic setting is that of any field training camp. The patients are grouped into military units and assigned to temporary buildings or tents under the immediate supervision of line officers oriented to the purposes of the center. No attempt is made to group patients as to their injury or disability. Orthopedic, surgical, medical and psychiatric patients are to be found here. The latter group is usually in the minority. In common, all patients have shared time and perhaps experiences in a combat zone. All are considered as convalescents. The psychiatrist in this setting is unencumbered by administrative procedures. He is in an excellent position to oversee and indirectly supervise the activities of his patients and to administer such therapy as is best suited to the particular needs of the individual. It was found necessary in our therapeutic approach to these patients to separate illness or reactions to

battle and other combat theater stresses from the previous more or less inadequate functioning personality. Our goals in therapy were limited, though realistic, in terms of policy demands, most prominent among which were the salvage of manpower for duty either in the combat lines or support units. Little attempt was made to elicit a thorough-going social history which from our experience proved contributed little to the understanding of the individual's present illness. Only on rare occasions was it necessary to resort to psychometric or projective psychological testing; and when this was done, it was done by the psychiatrist himself.

Though it goes without saying that all patients under treatment are also under continuous diagnostic observation, our main approach was a therapeutic one with return to duty (either in a full or limited sense) as our primary objective. The hurdles encountered in this program and to be anticipated in any similar program may be described under the headings of those pertaining to the therapist and those incident to theater policy. Under the former and of primary importance is the natural inclination of the therapist to identify with his patient. Most naturally all of us feel considerable sympathy for the man who has been in combat particularly over an extended period of time. We are equally aware of our own personal concerns about the justice or injustice of having to return a man with several continuous months of Korean combat back to more of the same. In addition, one is naturally impelled to be aware of his own feelings of guilt over not having shared such an experience. It becomes necessary to be aware of these very real factors in the selection of therapists. We have found that in our experience the permissive, nondirective approach, though often well suited to intensive psychotherapy or even group therapy in a civilian setting, was definitely an inefficient and often times deleterious technique in view of our limited objectives and the limited time available for treatment. It is to be emphasized that in no sense of the word were we undertaking or attempting any character alteration. Rather, we were concerned with expedient reintegration of ego function on a level equal to the demands of either full or limited duty. Often times such patients were returned to a duty status, though still encumbered by various fairly mild non-incapacitating symptoms which, though discomforting to the patient, did not interfere with the fulfillment of his subsequently assigned duties. Therapy was conducted over a relatively short period of time ranging from two to several dozen half-hourly interviews during which the therapist actively and directly kept the attention focused on the real issues immediately at hand, both in the precipitation and the continuance of the patient's illness and, of course, the obvious clarification of transference phenomena where in evidence.

The milieu of the convalescent hospital was particularly suited for this purpose inasmuch as all patients were presumed to be returning to duty. No attempt was made to segregate psychiatric patients from surgical, orthopedic and others. Rather were they deliberately dispersed throughout the camp, and it is believed that this was an important factor in the results obtained. The convalescing battle wound patient was in no sense of the word a fount of sympathy, reassurance or in any way of support or comfort to the psychiatric casualty who did not have a visible physical scar or handicap. This left our psychiatric patient only with his therapist as a

source of support and understanding. Furthermore, in his most natural search for identification with his barracks buddies, he had to accept their mores, their lot and their questionable future in order to find audience for his gripes. To be an outsider, even for a psychiatric casualty, is a most uncomfortable and to-be-avoided situation.

In the therapeutic hour the patient could let his hair down, so to speak, but before the hour was over he had to put it up again and was reminded that at the termination of his stay at the camp he would be returned to duty. It was pointed out to him that in addition to the therapy given during the various hours it would be expected of him that he participate in the physical reconditioning program including the formations, the marches and the calisthenics; that he was a patient on his way back to being a full time soldier. Military courtesy was carefully observed, but in no sense of the word carried to the extreme. It is believed that this had much to do with the restoration of the individual patient's self-respect. It was pointed out to him deliberately and if necessary repeatedly that while at the camp he would have an opportunity to live again as a human being. His food would be good, there would be bedding, movies, time off during which he could take advantage of pass privileges and realistically he was given a caution about the various VD dangers. He was also assured that he would be held fully responsible for his social behavior, that his illness was no cause or excuse for breach of discipline and any infractions of the same would be promptly dealt with.

Though at first glance the above may appear harsh and unsympathetic, nevertheless, it realistically forced the patient to respect himself and very deliberately pointed out the standards by which others at the installation could respect him. It becomes obvious why constant awareness on the part of the therapist of his own counter transference is of extreme importance. The problem of identification has been mentioned as well as the pitfalls of a non-directive approach and the possible guilt feelings on the part of the therapist for his lack of combat experience.

The obstacle to health, secondary gain, had to be dealt with constantly and openly. We believe it was less of a problem in this setting than in a fixed hospital setting where the comfortable hospital atmosphere was conducive to continuance of disabling symptoms. To get well is to chance a return to combat, and little reasoning is required to understand the profit of remaining a patient, albeit an uncomfortable patient. This gain in illness resistance was most naturally difficult to overcome. Oftentimes it was merely breached and occasionally the defenses, particularly in the passive-dependent, passive-aggressive and aggressive personalities were never dented. In no instance was it demanded that our patient gleam with health. Once it was believed that a man was able to do duty, either with or without his symptoms, he was recommended for return to duty. At all times his positive ego assets were buoyed, braced, and reinforced. Good motivation was searched for and rewarded by a show of interest on the part of the therapist. Sympathetic understanding was given for distressing family or other personal problems. The services of the Red Cross and the Chaplain were occasionally enlisted, but at all times the patient knew the therapist was trying to get him well for duty. Hostility to this approach in all of its various gradients and guises, which was not an

infrequent occurrence, was interpreted and exposed for discussion whenever it impeded therapy.

Our results were impressively significant: approximately 42% of all patients received from the combat zone were returned to their units; 42% were returned to non-combat duty; 11% were transferred to another hospital for further and more specialized treatment and the remaining 5% were transferred to other services in the hospital or made part of the center cadre. These statistics cover a four month period during the year 1951.

The approach outlined above can be modified for use in any or all echelons of treatment. Essentially, the problems encountered will be the same if the

goals in therapy are salvage for duty. It is believed that a greater emphasis in the future on the use of the convalescent hospitals as centers for therapy will be richly rewarded.

SUMMARY: Brief psychotherapy is a useful and profitable technique in wartime. Its best environment is that of a convalescent center, located preferably in the zone of communications. It should be directive, limited in focus to the present illness and not elaborated into a character-alteration therapy. Ego support and/or reintegration is stressed. Secondary gain factors are kept to a minimum. Therapists are cautioned against identification and a non-directive approach. Goals are salvage for duty, not the creation of a superman. Percentages are given for results of treatment over a four month period.

OUT-PATIENT PSYCHIATRY IN AN OVERSEAS THEATER

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This paper presents a resume of the problems of an Army out-patient psychiatric clinic in an overseas wartime atmosphere. The material to be discussed represents the experience of the author in the Out-Patient Department of the 155th Station Hospital in metropolitan Yokohama during the first six months of 1951. This hospital served many nearby Army units and a large number of dependents housed in the vicinity.

Broadly, the functions of such a clinic can be divided into two categories: evaluation and therapy. They will be described separately, first in general and then in more detail.

EVALUATION: Consultations may be requested by either medical officers or unit commanders. Those requested by other doctors may eventuate in the rendering of an opinion or the actual transfer of the patient for psychotherapy. In most cases, the evaluation is accomplished in one or more interviews, the nature of which will be discussed below. Evaluations requested by unit commanders are usually concerned with men who pose administrative problems, often of a disciplinary nature. Included in this group are pre-courts martial examinations to determine legal competency and so-called "clearance" examinations prior to administrative action under AR's 615-368, 615-369, and 600-443, the Army Regulations designed for the separation from the service of: (a) men with character traits inimical to the service, such as alcohol addicts, drug addicts, and severe character and behavior disorders (AR 615-368); (b) men who are unsuitable for military service because of less severe personality disorders, such as schizoid personality, the various immaturity reactions and the like (AR 615-369); and (c) homosexuals (AR 600-443).

TREATMENT: The main therapeutic method employed in this setting is brief (or "short-term") psychotherapy on the basis of once or twice a week out-patient interviews. In addition, environmental manipulation in the form of recommendations for reassignment is utilized. The more seriously ill patients are referred to Army hospitals with in-patient facilities.

The large work load made it necessary to allot methodically the available time. Each working day of the psychiatrist was divided into two parts. The morning was used exclusively for evaluating new pa-

tients and the afternoon was given over entirely to therapy and occasional psychometric testing. The first hour of the morning was used for in-patient consultations on the medical and surgical wards of the hospital; it was found best to leave this particular hour vacant for this purpose because out-patients scheduled for this early hour were often unable to arrive on time from their organizations. The remaining three hours of the morning were allotted to six new patients, thirty minutes to each. The afternoon, being used for patients who had elected to come in for psychotherapy, was divided into four periods, one hour for each therapy patient. Thus, theoretically, approximately twenty patients could be carried in therapy at any given period. In practice, only about sixteen of these hours were actually used during any one week, the remaining time being utilized for psychometric testing, the writing of consultations, and the completion of patients' records.

THE INITIAL INTERVIEW: During the initial thirty-minute interview, each new patient was given an opportunity to tell his story, prompted by as many questions as might be necessary in the particular problem involved. The purpose of this interview, in all cases, was to obtain a reasonably clear picture of the patient's present situation and, if possible, general character pattern, as rapidly as possible so that an early decision on the further management or disposition of the case might be made. As a result of the initial interview, the patient was placed in one of the following categories:

1. Patients who were considered candidates for psychotherapy.
2. Patients who were not considered candidates for further therapy and for whom no psychiatric attention was needed or indicated.
3. Individuals who were granted psychiatric clearance for administrative action, or for whom such action was recommended.
4. Individuals who were considered to have situational maladjustments, for whom recommendations were made for environmental changes (chiefly reassignment).
5. Patients requiring hospitalization.

6. Patients requiring future appointments for further evaluation.

To discuss these various categories individually:

1. All patients who presented current problems about which they showed some concern were offered psychotherapy. For example:

Case I: A 34-year old woman, wife of a M/Sgt, referred from Women's Clinic. Patient's husband came to Japan in April 1948 and she followed in November 1948. The couple have three children, all in school here. Patient has been drinking excessively for several months, an extension of a pattern of moderate drinking that has gone on for years. She is quite depressed, feels that nothing is worth anything any more. She freely states the cause for her feeling this way, saying her relationship with her husband is very unsatisfactory and that he has neglected her sexually for the past two years. She says he has no interest in intercourse; she drinks to stifle her sexual desire.

History from husband is completely contradictory. He says he wants intercourse but that she is not interested. He has not approached her now for six months; says every time he has approached her during past two years she has refused him. He appears to be a very hostile, rigid, defensive person.

Patient was offered therapy and eagerly accepted.

(This patient was seen for six interviews, and the case came to a successful termination.)

In cases considered suitable for psychotherapy, it was explained to the patient that the method of approaching a problem such as his was through talking, and the plan of weekly or more frequent out-patient interviews was outlined to him. It was made clear that the therapist was not forcing him to come in for treatment, but was offering him the opportunity and assistance, if he were interested, of overcoming his difficulty at this level. The advantages of this technique of offering therapy are two-fold. First, in seemingly indicating that the responsibility of the decision was on the patient, one adheres to the generally accepted principle that psychotherapy could be more effectively accomplished when the patient cooperated consciously. Second, this method avoids the making of promises which may never be fulfilled. The most positive statement ever made to a doubting patient about the outcome of therapy was that the type of treatment offered was frequently of definite value, in cases like his. Avoiding promises of great benefits from therapy is in a very real sense a matter of maintaining intellectual honesty with the patient.

A special note is needed regarding patients with physical symptoms such as functional gastrointestinal disturbances and tension headaches who did not accept easily the idea of emotional origin of such symptoms and who presented no apparent emotional problem at first glance. In these cases, an attempt was made to convey to the patient the general concept of symptoms arising from emotional disturbances, and after this initial explanation every effort was made to channel the discussion away from the symptom into whatever problem might appear. As might be expected, in some of these cases, the patients clung with great tenacity to the symptoms and used them as shields against all attempts to elicit any actual conflict material.

2. A large number of patients referred for consulta-

tion were not considered candidates for therapy. This often occurred in the person who, from the beginning of the interview, made it plain that he was present only because he had been told to be and that he had absolutely no interest in seeing a psychiatrist. Also in this category was the patient who had no internal conflict and was merely seeking some tangible gain such as a certificate to release him from strenuous duty. Another not infrequent example was the patient who realized promptly that he could handle his problem without help.

Case II: A 21-year old enlisted man. Patient says his CO thought it would be a good idea for him to see a psychiatrist. (There is no actual request for evaluation from the organization.) Patient has a rather sordid history: Has been "busted" four or five times in his 3½ years in the Army, each time for being AWOL. Also has had several courts-martial for being AWOL. Claims he "blacks out" at times. Was recommended for a "369" in the States, but it did not go through. The problem now: "To tell you the truth, I want out of that outfit." He says this in smiling fashion, and displays no anxiety. Further questioning reveals that patient joined the Army "because of the uniform" and because he was tired of trade school. Was in reform school twice 1945-47 for truancy. Diagnosis: Antisocial Personality.

3. Individuals who were granted psychiatric clearance for administrative action, or for whom such action was recommended. This group consists of persons referred to the clinic usually by unit commanders for clearance prior to administrative separation from service or courts martial, or for the psychiatrist's opinion on the handling of a "problem" soldier. In most cases in which an organization has initiated proceedings for a "368" or "369" discharge, a statement must be rendered as to the presence or absence of any condition which would warrant medical separation from the service, and a statement as to the mental competency of the individual. It is good practice to incorporate these statements in a more or less complete psychiatric summary of the case, with diagnosis if any. This summary can be used in the board proceedings. It should be noted that at times the making of a diagnosis of character or behavior disorder leads to confusion in the minds of the administrative authorities; in certain of the cases handled through this clinic, great difficulty was encountered in trying to explain that such a diagnosis in no way contradicts the statement that no condition exists warranting medical separation. It should be made quite clear then that this group of disorders is not considered to be illnesses for which medical discharges are given.

There are men referred for psychiatric evaluation in whose cases the psychiatrist, after assessing the background and present performance, believes administrative separation ("368" or "369") to be indicated because of unsuitability for service.

Two examples are given here, the first being the case of a man who was to be brought before a board by his organization; the second, the case of a man for whom administrative separation was suggested by the psychiatrist.

Case III: A 19-year old enlisted man, referred from organization for "368" clearance. Patient blandly gives long history of disorderly conduct and petty criminality. Arrested several times in civil life for drunkenness. Has no plans for the future. No signs of psychosis. Letter from organization indi-

cates that the man has continued his pattern of antisocial behavior since being inducted a few months ago. Clearance granted with diagnosis of Antisocial Personality.

Case IV: A 20-year old enlisted man, referred from organization for psychiatric evaluation. Patient gives lifelong history of marked inadequacy; has never been able to "keep up"; dropped out of school because of lack of interest rather than lack of intelligence. Has formed no real friendships. Is interested in nothing; has no plans. Clinically, he is a dull, adynamic individual, lacking in energy and presenting no anxiety. No signs of psychosis. Telephone conversation with unit commander reveals that patient has presented a problem because of his laziness and lack of any enthusiasm. Punishment has not succeeded in making him a more satisfactory soldier. "369" discharge was recommended with diagnosis of Inadequate Personality.

It was with this group of administrative problems that direct telephone contact with the individual organizations was most appreciated. The situation of this particular clinic was such that it subserved a large number of more or less permanent units within a radius of a few miles. Hence, telephone contact with unit commanders was quite feasible and was frequently employed. By this method, it was possible to fill in the gaps in the historical material sent in by the organizations, and to obtain histories in the all-too-common cases in which none had been furnished. It was also possible to discuss with unit commanders on an informal basis the problem presented by any particular man, and try to arrive at some satisfactory solution, often in terms of separation from service or change of assignment. It was a continual source of amazement that many of the unit commanders seemed unaware of, or loath to make use of the administrative channels through which persistent trouble-makers can be disposed of. The psychiatrist here can certainly be said to be educating line officers concerning the existing regulations for the handling of ineffective soldiers.

4. Individuals with purely situational maladjustments. This group consisted of men with good past performance records who appeared to have become involved in situational difficulties. For these men, reassignment was often recommended. Occasionally, too, reassignment was recommended for men with marked residual "combat anxiety" who had been placed in jobs for which they were not ready.

5. Hospitalization was employed in the cases of those patients who were psychotic or who required immediate treatment and/or more observation than could be carried out in a busy out-patient clinic.

6. Further observation (on an out-patient basis) was necessary on some patients in order to clarify the problems presented. These patients were asked to return to the clinic for psychometric testing or another interview. Some of these cases were borderline mental defectives who required Wechsler-Bellevue testing to establish a more definite diagnosis. Seven Wechsler-Bellevues and two Rorschachs were given in the three-month period covered by the statistics below. Because of the relatively small number of such tests used, the psychiatrist in the clinic administered them himself and did not employ the services of a clinical psychologist.

THERAPY: Brief psychotherapy was employed, with the focus on current problems. Every effort was made to

avoid going into deeply repressed and other unconscious material beyond the scope of brief therapy. This article is not the vehicle in which to discuss the principles or technique of psychotherapy; it should be stated, however, that the method of treatment used in this clinic utilized analytic principles as its basis.

It will be noted in the statistics below that of a large number of patients who stated that they would come into the clinic for treatment, many failed to appear for their first appointments, while another relatively large group stopped appearing for appointments with no explanation. In considering this rejection of therapy, it should be realized that many of the military cases seen in this clinic have situational difficulties which require only one or two therapeutic interviews for them to be aware that either they can solve their own problem or they must continue to perform their duties despite discomfort or dislike. In this, such cases approximate the normal adjustment by suppression which occurs in the average adaptation of the adult.

The individual interrupts treatment when he realizes the situational cause of his feelings and his symptoms and subsequently is aware that it is up to him to make the required effort. Not infrequently such subject matter comes forth in the first or second interview when the patient spontaneously states "well, if this is how it is, I guess it's up to me", or "I guess I'll have to learn to get used to it", or like comments. In some patients, rejection of treatment occurs because the therapist has not offered or agreed to any tangible gain for the individual who not uncommonly seeks benefits more concrete than psychotherapy, such as hospitalization or evacuation to the ZI. Another probable but relatively minor cause for the discontinuance of therapy is the fear of what some individuals feel is the stigma attached to "going to a psychiatrist."

RECORDS: It is important that a record be kept on each patient seen at the clinic. Such records are invaluable because of the fact that so many patients are seen more than once for various reasons. Moreover, a follow-up system can be instituted if records are kept. Basic information needed on each patient's clinic file card includes name, age, grade, serial number, organization, source of referral, and the psychiatrist's brief remarks on the case, entered during or just after the initial interview. The card on each patient can be kept up to date by simply entering on it any piece of information obtained on the patient through any channels. With a little effort, follow-up information can be obtained on hospitalized patients and on those on whom administrative action is pending. With therapy cases, this writer found it useful to keep a fairly complete record of each interview.

A sample file card might bear the following entries below the identifying information:

"3 March: Pt. referred in because of tension headaches for past three months (since return from Korea). Was in Korea in an infantry outfit for four months, evacuated for frostbite. Was in Osaka Army Hospital about a month, not seen at the time by a psychiatrist. Has been in present organization ever since. Hates organization; has strong feeling of dislike for all Orientals. Presents clinical picture suggestive of psychopathy, with much hostility. Offered therapy on out-patient basis, and pt. accepted.

"7 March: Failed to appear for first appointment.

"10 April: Pt. brought into emergency room last night by the MP's in what was apparently an alcohol-induced temper tantrum; sober when seen this morning and ready to go back to duty. "

SUMMARY: The statistics below cover the activities of the clinic over a three-month period. They set forth the relative number of patients coming from various referral sources, the number falling into each major diagnostic category, and the disposition of all cases. Of particular interest is the follow-up material on patients who were recommended for one or another sort of administrative handling. This fairly complete follow-up was made possible by the close contact with unit commanders described above. The small number of patients among those recommended for 615-368 and 615-369 discharges who were actually given such discharges suggests a need for some amending of the procedure involved to make it easier for men with troublesome character disorders to be disposed of. It was most gratifying to note how many patients for whom a change of assignment was recommended were really given different assignments.

It should be noted that diagnoses were made on the basis of underlying character structure since it was felt that this more accurately reflected a patient's difficulty than the immediate situational or symptomatic upheaval which leads to contact between patient and psychiatrist. For example, it is an error, in my opinion, to diagnose a passive-dependent character as an "anxiety reaction" in some particular situation in which he shows anxiety, because this pattern of response is repeated whenever he is confronted with even the minor stresses of overseas existence.

Final diagnoses are employed in all cases in which the patient was seen more than once. The complete absence of the so-called "somatization reactions" is no accident, but rather the result of the author's opinion that this group of diagnoses is too superficial in most instances. Almost all cases of "psychogenic gastrointestinal reaction", for example, can be found to be passive-dependent characters, and were so diagnosed in this clinic.

TABLE I

Sources of Referral

Medical sources.....	188
Organizations for evaluations and "clearance" examinations.....	53
Self-referral.....	22
Miscellaneous.....	28

(Note: The patients seen in the 155th Station Hospital as in-patients, not being seen in the clinic, were unfortunately not recorded in the file adequately in many cases. This table, therefore, omits approximately 40 patients seen in the hospital during this period. It also omits a rather large number of men seen purely for evaluation for "physical profile")

TABLE II

Diagnoses

Neurotic Disorders.....	85
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Immaturity Reactions.....	73
Pathological Personalities.....	35
Psychotic Reactions.....	12
Alcoholism.....	11
Narcotic Addiction.....	4
Homosexuality.....	3
Mental Deficiency, Primary.....	4
Malingering.....	5
Acute Situational Maladjustment.....	10
No Disease Found.....	46

(Three patients were not diagnosed because of insufficient study.)

TABLE III

Dispositions

Offered psychotherapy.....	100
No psychiatric treatment indicated.....	98
Recommended for "368" or "369 discharge by the psychiatrist.....	31
Given clearance for administrative action initiated by units.....	25
Hospitalized.....	29
Recommended for change of assignment.....	12
Referred elsewhere for out-patient therapy (childhood behavior disorders).....	2

TABLE IV

Follow-up Information

- Of 31 patients recommended for administrative discharge by the psychiatrist:
 - 5 were discharged
 - 12 were disapproved for discharge, of whom five showed enough improvement in conduct to make discharge unnecessary
 - 15 could not be followed to completion because of long delays in administrative action or because of transfer out of the area
- Of 12 patients recommended for change of assignment:
 - 7 were granted new assignments
 - 5 could not be followed
- Of 100 patients offered out-patient therapy:
 - 79 stated that they would return for therapy
 - Of these 79: 27 failed to appear for first appointment;
 - Of the remaining 52:
 - 15 showed some improvement with therapy
 - 7 terminated with no improvement
 - 16 stopped appearing for appointments with no explanation
 - 3 were eventually hospitalized
 - 5 were terminated at therapist's suggestion
 - 5 were transferred out of the area while therapy was in progress
 - 1 case was incomplete at this writing

(There were two known relapses after what had been thought to be successful terminations.)

A final note is indicated concerning the seemingly preponderance of "dispositional" work done by a psychiatrist in this position. It might appear that

little is accomplished in a therapeutic sense, considering the above statistics. However, one must remember that a military psychiatrist sees many patients who would never come to the attention of a psychiatrist in civil life because many of the problems are situational difficulties which cannot be readily resolved as in civilian life by unilateral action on the part of the individual. When this is considered and the fact that such cases can be helped by only one to two therapy sessions, it can be appreciated that the goals and interest in psychotherapy are not far removed from those of civilian practice.

The possibility of conducting out-patient psychotherapy on a basis very like that of civilian practice was a most gratifying feature of this clinic. A number of interesting cases were handled, with results which could not be classed as disappointing. It should be noted that the more prolonged therapy cases were, in general, those of non-military personnel, i.e., dependents of occupation troops. The fact that there was no question of secondary gain

and less of a situational factor involved in these cases, placed them in a category similar to that of clinical material presented in civilian psychiatric practice.

Rapid treatment combined with evaluation is a necessary part of a military psychiatrist's job, and is, in itself, not devoid of therapeutic implications. The handling of serious character disorders according to what might be termed the "reality principle" is surely more salutary for the patients themselves than would be any handling which would tend to create secondary gain, such as hospitalization, with its attendant pull toward regression, or medical discharge from the service with pension. In addition to these factors, it should be remembered that what happens to one man has its effect on other men with whom he comes in contact. The establishing of a medical "leak" through which men with character and behavior disorders could escape their obligations would inevitably have a deleterious effect on the morale of the groups to which such men belong.

MEDICAL EVALUATION OF THE NON-EFFECTIVE OFFICER

Colonel Albert J. Glass, MC, Neuropsychiatric Consultant, Med Sect, GHQ, FEC

The recent campaign in Korea has brought into prominence the not infrequent practice of using medical facilities to remove non-effective officer personnel from their units. This does not refer to the disabled officer suffering from organic or psychiatric illness, but rather to those individuals who displace or blame their inability to perform stressful duty on to bodily or psychiatric symptoms. Such officers verbalize the normal disagreeable physical and psychical sensations of combat, which for them become exaggerated to an illness. They complain of backache, headache, insomnia, gastrointestinal disturbances, nervousness, and anxiety. Some frankly state that they cannot function in combat, but are excellent in other assignments. The non-effective officer is conspicuous by his failure to demonstrate the emotional stability and capability of a combat leader, and is in sharp contrast to the officer psychiatric casualty who has performed effectively in combat prior to a severe battle episode which caused his breakdown.

The basic cause of non-effectiveness in combat for any individual may vary from a conscious unwillingness to unconscious personality defects which prevent or limit his adjustability to any unusual or difficult situation. Almost anyone may become temporarily disorganized under severe stress, but soon the ability of the personality to adjust makes itself manifest and a learning process develops. Most non-effective officers are incapable of making the necessary adjustment and it is evident that such individuals do not possess the necessary qualities of a combat leader.

The medical officer is usually confronted with this problem because the non-effective officer either personally seeks medical evacuation or is sent to the medical officer by his immediate superior. Often in the heat of combat and with the necessary limitation of time a correct evaluation of such an individual cannot be made, and he must be further evacuated to the next medical echelon. Too often the individual continues to be evacuated even out of the theater of operations where his symptoms subside and he

is returned to non-combat duty. Such hasty evacuation lowers the morale of officers who continue to perform their hazardous duties and gives the impression that failure is rewarded, with the implication that the Medical Department is responsible. A correct and fair solution of this problem would be to expedite a reasonable evaluation of such cases, preferably near the location of their origin. In combat divisions the medical officers of the Clearing Company, including the division psychiatrist, should be able to arrive at a correct diagnosis. For other units, nearby evacuation hospitals should be utilized. Only rarely should there be cases which require extensive study and further evacuation.

In considering the diagnosis of non-effective officers primary importance should be given to motivation, previous military performance, and personality inventory of the subject. It is obvious that the officer who consciously displays poor motivation is not sick or disabled. The subject who has performed in a mediocre or indifferent manner in the past usually cannot be expected to do better under more stressful situations. There are many officers who have done good or excellent work in previous non-combat assignments. The personality of these non-effective officers reveal excessive basic insecurity which is compensated for by various character traits. Such individuals may be overly dependent, overly passive, overly cautious, or overly aggressive. These character traits may serve them well in most routine jobs, but in combat or other unusual circumstances the neurotic defense against fear fails and because they have no further resources they become overwhelmed with anxiety and are literally incapable of effective action.

The duty of the medical officer in the case of the ineffective officer is clear and unequivocal. If, after evaluation, the medical officer can find no disabling organic or psychiatric disease the officer must be returned to duty. The diagnosis may be, "No disease, poor motivation", or any of the character or behavior disorders as outlined in SR 40-1015-2. A copy of the findings should be sent to the patient's

unit commander. The further handling or disposition of the non-effective officer should be along administrative lines under the provisions of AR 605-200. This regulation provides for the separation, demotion or elimination of non-effective officer personnel. Pertinent excerpts from paragraph 4 of AR 605-200, stating the reasons for the utilization of this regulation are as follows:

"Demonstrated inability to exercise the necessary leadership or command required of an officer of his grade."

"Habitual intemperance or recurrent instances of other personal misconduct."

"Apathy, defective attitudes, or other character and behavior disorders to include inability or unwillingness to expend effort. Attention is directed to SR 40-1025-2."

This may seem to be a harsh policy but in reality it only corrects an administrative error. No one is forced to accept a commission and when an officer does not possess the required qualifications, corrective, not punitive, measures are indicated. There may be instances where the medical officer may be urged to evacuate non-effective officers under the guise that there is no time for administrative action, or a replacement is immediately needed, or a feeling of pity for the individual. It is important to note that the morale and the very lives of soldiers depend upon the effectiveness of their officers. The medical officer should resist such pressure since the perpet-

uation of a group of ineffective officers is a serious mistake.

What has been stated above applies with equal force to routine military practice, whether it be in occupation duties or in the zone of the interior. Many officers promptly break down after overseas assignment or when sent to some less desirable post. Here too they show limited ability to adjust to a relatively mild environmental discomfort. This maladjustment may be manifested by symptoms, excess alcoholism, or acts of misconduct. Where no disease is present such cases properly come under administrative procedure, as outlined in AR 605-200 rather than handling through medical channels. The non-effective officer cannot be considered ill since he loses all symptoms when the external situation is altered to his satisfaction. It is rather an immature reaction to adult responsibility. It may well be that transfer to another assignment or location is indicated, but this is an administrative and not a medical matter.

CONCLUSION: A most important factor affecting the fighting strength of our armed forces resides in the effectiveness of our officer personnel. Non-effective officers who are not disabled by organic or psychiatric disease, but who do not possess motivation or qualities required by an officer should not be removed from their units via medical facilities. It is the function of the medical officer to insist that such non-effective officer personnel be handled through administrative channels, under provisions of AR 605-200.

MEDICAL EVALUATION OF THE NON-EFFECTIVE SOLDIER
Colonel Albert J. Glass, MC, Psychiatric Consultant, GHQ, FEC

The purpose of this article is to clarify the function of the medical officer in the management and disposition of the non-effective soldier. Non-effectiveness as defined herein is restricted to individuals without physical and mental disease but who demonstrate inadequate duty performance. More specifically, this communication refers not to disabled soldiers, but to individuals who either by virtue of poor attitude and motivation or personality disorders, are disciplinary problems or handicaps to their organization. Non-effectiveness is usually manifested by either symptomatology (such as backache, headache and fatigability), or disciplinary difficulties (which include alcoholism and drug addiction).

While most disciplinary infractions are handled by direct administrative action, it is common practice to refer less overt instances of non-effectiveness to unit medical officers and military hospitals. This occurs because of the quandary of the line officer who feels insecure in dealing with soldiers who may belong in the realm of mental and physical disease. There exists also the unconscious and sometimes conscious desire of unit commanders for medical evacuation to rid them of vexing problems and thereby avoid the more difficult and time-consuming administrative procedures. Frequently, the medical officer is aware of the problems of the line officer and is in sympathy with his dilemma. The indefinite boundary between symptoms and disease may be utilized by both line and medical officers as a basis for medical evacuation. They argue convincingly to

themselves that the individual very probably has something wrong with him and anyway, he is of no value to the outfit. This line of reasoning is even more true where the field of mental abnormalities is concerned. The unit commander can easily rationalize that the alcoholic, the drug addict and the disciplinary offender must have some kind of mental illness, otherwise he would not act in such an abnormal manner. Regardless of motives, the line officer does need medical support to help him arrive at a medical solution in the disposition of the ineffective soldier. In order to properly render such support, it is necessary that medical officers become familiar with the mechanisms and causes of non-effectiveness in the military service.

Non-effectiveness represents a failure of adjustment to a given situation. Man cannot remain static but must have the ability to alter his methods of obtaining gratification and his goals in accordance with the realities of a changing environment. The degree of adjustability among individuals varies considerably; there are persons who can adjust in only a limited manner under specified conditions. For example, a soldier may be effective only at a certain type of work when stationed near San Antonio, Texas, where he can see his wife and mother daily. Others have the ability to sustain themselves in an effective manner in the stressful environment of severe combat. Again there are individuals with severe personality defects who cannot adjust under any circumstances and exhibit a life-long pattern of repeated failures.

To consider only the role of the individual is insufficient to explain fully the struggle involved in adaptation. One must take into account the nature and severity of the various external stresses imposed upon the person in order to appreciate that adjustment is the end result of an interaction between a particular personality and specific environmental forces. The exigencies of military service place a strain on the adjustment resources of the soldier. A civilian can find a niche for himself and maintain a relatively constant environment. The soldier must be prepared and able to function efficiently under conditions which vary from frequent changes of unit commanders, overseas separation from his loved ones, and to the uncomfortable and hazardous life of combat.

Another pertinent environmental factor is the motivation of the military unit. It is usual for soldiers to identify with others in their group. The newcomer soon assumes the ideals and attitudes of his organization. Units with poor morale do not require effective preformance by the individual and do not support each other in times of stress. Organizations with high morale insist on efficient standards of duty and in this way sustain each other in overcoming adversity. Leadership is the most important single factor in the production and maintenance of unit morale. The officer who is ineffective as demonstrated by his overt insecurity or unfair and neglectful treatment of his men, adds further stress to the already difficult milieu of the soldier. The good leader supports the soldier and enables him to initiate and maintain effectiveness under severe adverse circumstances.

The basis for medical recommendations in the management and disposition of the non-effective soldier can be best demonstrated by considering the usual problems encountered by individuals of various personality types. The following division of individuals into separate groups should not be taken in a finite sense but for descriptive purpose corresponds to the relative degree of personality dysfunction:

THE AVERAGE SOLDIER: The average soldier has a relatively stable personality and can adjust effectively even under severe stress when he is in a unit with good morale. There may be occasions when he becomes temporarily disorganized but his adjustment faculties are sufficiently elastic for him to resume his previous adaptability promptly. Good leadership facilitates this adjustment process.

More pertinent are the avoidable circumstances which may produce non-effective behavior and performance even by the average soldier. Such difficulties are usually the result of faulty functioning of command and range from unfair treatment by the unit commander to the malassignment of individuals to positions for which they are unsuited from the standpoint of training and intellectual endowment. The resultant ineffectiveness may be exhibited in the form of unwillingness, mild disciplinary infractions, and vague symptoms such as headache, tension and insomnia. Under such continued adverse circumstances, the individual loses his ability to feel as one with the group and blocks his inner insistence to conform, since he feels he is being treated unjustly.

This state of affairs can be recognized by the medical officer because of his good performance record even under adverse conditions prior to his current difficulties. The medical officer must be cautious in evaluating the administrative complaints of soldiers, yet unmistakable evidence of mismanagement is

usually elicited from the often dispirited, mildly hostile, and depressed soldier. It is important for the medical officer to communicate his findings to the unit commander outlining the causative factors and recommending that remedial action by him is indicated. It is not necessary or even desirable to state specifically the type of remedial action. This falls more properly within the province of the line officer.

THE UNWILLING SOLDIER: The unwilling soldier is a poorly motivated individual who can perform effectively only by virtue of outside insistence. This type of individual is intolerant to the attendant discomfort experienced by everyone when forced to make an adjustment under conditions which are disagreeable. He is easily influenced by gripes and rationalizations which convince him that his situation is intolerable. Essentially he is a selfish person who can see no reason for enduring hardship when there is no personal gain involved. Such a feeling is present in all of us, but in the average soldier there is an insistent inner demand and self-pride which forces him into a spirit of cooperation. The unwilling soldier lacks this inner demand to conform. It follows that the external pressure must be substituted in order to make him perform adequately. The unwilling soldier often presents himself as being unable to perform duty because of physical complaints. The medical officer can arrive at a proper evaluation after a reasonable physical examination, a history of over elaboration of external difficulties, common to all, and a background which indicates previous attempts to avoid onerous tasks. The recommendations of the medical officer should include the diagnosis of no diseases, poor attitude and motivation, with the information that the individual has the capacity to perform adequate duty. The line officer is then free to apply remedial measures and to feel secure that he is not doing an injustice to the individual.

THE IMMATURE SOLDIER: The immature soldier is characterized by a retarded emotional development which is not commensurate with chronological age and physical growth. The result is an individual who exhibits ineffectual, childish, or adolescent behavior when exposed to slight or moderate environmental stress. Almost anyone may temporarily demonstrate immature behavior under the impact of severe external pressure. The immature person with a limited capacity for adjustment is more readily influenced by fluctuations in the environment; in effect, he is as if internally crippled and therefore unable to alter or sustain himself under varying circumstances. Basically, the personality defect lies in the inability of the immature individual to either mobilize or adequately discharge aggression when such an adaptation is necessary for effective action.

There are various types of immaturity reactions, dependent mainly on the manner in which aggressive impulses are manifested. Perhaps the most common variety is the passive dependent personality. This type of person is illustrated by the timid, passive, fearful soldier who seldom fires his rifle at the enemy, faints at the sight of blood, shies away from physical fights and even verbal arguments, and is readily rendered helpless when under dangerous stimuli. Here we see clearly the effects of almost complete inhibition of aggressive drives, usually the result of severe intimidation during the early formative years of life. The passive dependent person is rarely a disciplinary problem and often gives effective performance in garrison duty or in a protected overseas assignment. He may have an excellent military record prior

to the current stressful situation. Depending on the degree of passivity in the character make-up, many of this immaturity type can be helped to a more aggressive adaptation by such measures as training, with a consequent increase of confidence in himself and his weapons; group identification, which gives emotional support to lessen his inner feelings of insecurity and makes it possible for him to assume the aggressive attitude of the unit; and individual guidance by NCO's and officers who by advice and example demonstrate a more logical approach to danger than trembling and helpless inaction. Individuals with a severe personality difficulty of this type may only be able to perform noncombat duty.

The next common type of immaturity is the passive aggressive individual. He is also conspicuous by the absence of outward manifestations of aggressiveness but demonstrates some degree of hostility in the form of stubbornness, procrastination, and obstructionism. This type of person may appear resentful but denies such feelings, usually stating that he cannot work because of headache or backache. He denies to himself feelings of insecurity and finds superficial rationalizations for his ineffective performances under stress. The passive aggressive soldier may also have had a previous good record when under minimal stress. He is different from the unwilling soldier in that there is an absence of words or actual acts of aggression. This points to the real defect in the personality and indicates that any evaluation and recommended corrective measures must be oriented along the lines of overcoming excessive insecurity by support and training as outlined under the passive dependent type.

Least common is the aggressive personality. These individuals are quite tense when under stress because of marked insecurity. Uncoordinated and ineffective aggressive outbursts may result from the consequent accumulation of tension. These explosive outbreaks are seldom directed against the enemy but usually occur against a friendly and safe environment. It is similar to the temper tantrum of childhood which may be effective at that age in gaining an objective but is far from an adult adjustment. Here again evaluation and management must be based on the degree of severity of the personality defect and similar measures are indicated to help the individual overcome his underlying excessive insecurity.

A special form of immaturity is that exhibited by individuals with enuresis. This may be combined with other manifestations of immaturity or exist as a single phenomenon. Essentially, enuresis is an infantile or childish manifestation of hostility which recurs in adult life when external danger makes it difficult if not impossible for them to utilize later acquired aggressive adaptations. It is common for the enuretic to give a history of bed-wetting often up to 13 or 14 years of age after which there is a spontaneous cessation with recurrences at various stressful times in their adolescent and adult years. This archaic mechanism of hostility is usually unconscious to the person.

Threats and coercive action rarely have any corrective value. The important principle of how effective the individual functions even with this habit should be the criterion for reassignment or release from service under AR-615-369. Enuretic soldiers in combat have a difficult problem because it is impossible to change clothing. Individuals in rear and support units where laundry service and washing facilities are readily available can often continue rendering adequate duty, particularly since the enuretic habit may be less frequent when the environ-

ment is more secure. Discharge from the service should be considered when enuresis is combined with other manifestations of a severe degree of personality disorder.

THE ABNORMAL SOLDIER: The abnormal soldier or the pathological personality has such severe defects or distortions of character that he represents the largest deviations of behavior from the average soldier. This type of person is usually incapable of consistent effective adjustment even under favorable conditions. The environment plays a negligible role in the adjustment process because the basic difficulty is inherent in the individual who is unable to obtain gratification of his needs except by means and methods considered abnormal or frowned upon by society. Included in the pathological personalities are antisocial individuals, asocial or the criminal group, the withdrawn or schizoid personality, the drifters or inadequate personalities, the narcotic and alcohol addicts, and the sexual deviates. It is evident that while abnormal soldiers have in common pathological personality traits, it would be an error to consider them a homogenous group. They are rather a mixture of several dissimilar smaller groups, each one having its characteristic internal disharmony and external manifestations. A brief description of the various types of pathological personalities follows:

The anti-social personality: This soldier is characterized by repeated but relatively minor disciplinary episodes. He rarely commits a major offense such as desertion or murder. Alcohol excesses on and off duty are common. His life pattern is replete with similar antisocial events, none of which have merited a long prison sentence. He is restless and cannot be satisfied by the usual pleasurable methods. He is unable to feel loyalty to a person, group or code. It is characteristic for him not to profit by experience or punishment as he seemingly does not possess the inner motivating force of conscience. Often he is quite mentally agile and appeals to the unwary to give him another chance. For brief periods of time, he can do even superior work and may in this manner continue on in military life because of his ability to convince others that he will do better in the future. When in disciplinary difficulty, he pleads amnesia or physical illness in an effort to enlist the aid of the medical officer. He well known to the psychiatrist as "a psychopath" and valiant efforts by expert therapists usually result in failure.

The asocial personality: This is the individual who completely disregards the moral code. He constitutes the hardened criminal type and is commonly seen in penal institutions. Rarely does he voluntarily enter military service and usually makes effort to avoid induction by the draft. As a result, this type of abnormal soldier is seldom encountered by the medical officer unless for mental evaluation prior to general court-martial.

The schizoid personality: This is an odd individual, eccentric and exclusive, who lives in a small world of his own and is disturbed by associations with others. He compensates for human companionship by day dreams and fantasies. Others soon learn to leave him alone when their overtures are passively rebuffed. He is the most effective of the pathological personalities as often he can perform consistent, useful duty if not bothered, or placed in a solitary technical position. He becomes a problem when dislocated from his narrow environment. Once disturbed, it is difficult for him to regain

his previous adjustment. At best such individuals can be utilized in only a selective limited manner because their capacity for adjustment is minimal.

The inadequate personality: This is a rather well-known abnormal soldier who is conspicuous by his failure to respond adequately to the physical, emotional and mental demands of the environment. Like an infant, he is helpless and usually gives a variety of bodily complaints to explain his shortcomings. He has a life-long pattern of inadequate performance, although in civilian life he may have made a marginal adjustment in a menial or part-time job. He is a drifter as he moves from place to place or from job to job in a vain effort to find someone who will take care of him. Frequently he voluntarily enters military service in the hope he will be provided with the necessities of life with few demands upon him. If married, there is a helpless dependency on his wife. He is seemingly only effective in the production of offspring. Inevitably, this type of individual has an Army record of being tried on every type of work in his unit. He is seldom a disciplinary problem except in a minor way from alcohol excess or being late to work. Usually he is not hostile as he protests repeatedly that he has chronic back trouble or a persistent stomach disorder which he justifies by a long history of repeated hospitalizations and medications to confirm his story.

The alcohol addict: The alcohol addict must be differentiated from the temporary alcohol excesses of the average, the unwilling and the immature soldier. In effect, alcohol for the addict is a way of life. He can point to no actual frustrating or situational difficulty. His defect lies in an inability to lead an average existence and to be gratified by the usual objects in his environment. Like an infant, he is only satisfied and happy when he has a bottle in his mouth and when his stomach is full. He may do excellent work for periods of time which in his younger days may have been as long as one year. As he becomes older, his attempts to gain pleasure from the usual environmental sources become less and less effective. Not infrequently, he may give the appearance of a genial, generous and friendly person. When intoxicated, he pleads for sympathy and willingly agrees to any type of treatment, but this is only temporary and passes when the need for alcohol again occurs. He vexes his family and friends and infuriates his military superiors as he habitually fails to fulfill his solemn promises of remaining sober. Popular science publications have given the impression that alcohol addiction is a disease. This is readily seized upon by the unit commander who is desperately trying to transfer or otherwise dispose of the problem, and the addict who always pleads for another chance when he is involved in a disciplinary difficulty.

Both want the medical officer to be responsible for different reasons. In truth, alcohol addiction is not a disease but the individual's way of treating himself, of substituting the bliss of intoxication for the onerous and often boring details of daily existence. Treatment of this self-maltreatment is repeatedly demonstrated to be doomed to failure. Treatment of the underlying character defect is seldom desired by the addict. The only effective treatment thus far is Alcoholics Anonymous which substitutes another way of life for the addict. In this connection it is interesting that this regime is only effective if the addict maintains an active participation in the group. When he becomes inactive or disinterested, he returns again to the alcoholic way of life. It should be realized that the problem of alcoholism is a large one for the entire country.

Constant efforts are being made to improve our knowledge and management of the causes and effects of alcoholism. The opinions stated above represent only a small aspect of the problem which affects military efficiency.

The narcotic addict: What has been stated under "alcohol addiction" applies to narcotic addiction except in a more severe degree. The narcotic addict is not infrequent in this command because of the low cost and easy access to opiate drugs in certain areas of Japan and Korea. The narcotic addict is an even weaker individual than the alcohol addict in his inability to tolerate the usual discomfort of even garrison existence. He uses opium derivatives which have a more devastating effect upon the body than alcohol. The physical craving for the drug may be so strong that he will abandon his ethical code and stoop to any act to obtain the drug. He is a particular menace in military life since he is prone to initiate young, and susceptible soldiers in the path of addiction. Treatment is mainly unsuccessful unless rigidly controlled by incarceration for long periods of time. Such a regime may salvage the beginner in addiction, but rarely if ever changes the confirmed addict.

The sexual deviate: This abnormal soldier does not obtain sexual gratification by the various usual methods but finds it necessary to practice perversion of some type. In the vast majority of cases this consists of a desire for an individual of the same sex. The sexual deviate is an unfortunate and usually unhappy person who presents an age-old problem, the cause of which has its roots in the early formative years of childhood. It should be noted that the medical officer may be unable to arrive at a diagnosis in many of the cases referred to him because objective signs are not present and the history as given by the subject may be unreliable. Suspicion by others and effeminate mannerisms do not warrant a conclusion which may be unjust. In general, the service of the abnormal soldier is unsatisfactory and undesirable. Current AR 600-443 provides administrative methods of discharge from the service.

Disposition of the abnormal soldier: The abnormal soldier presents a difficult management and disposition problem. He is not psychotic from the clinical standpoint and is not insane in the legal sense. While he does have severe and unconscious intrapsychic pathology, he is only distressed or uncomfortable when blocked by outside sources from gratifying his desires. Therefore he is not considered to have a mental illness, although there is undoubted psychopathology. Rarely can he be salvaged or altered by psychiatric treatment even by the most expert clinical facilities. Coercion, threats, punishment, pleas and exhortations have little permanent effect. Imprisonment may satisfy the needs and demands of society but serves to intensify the internal difficulties of the pathological personality and may occasionally cause a transient psychotic outburst. Years of experience with the abnormal soldier has taught the military that, as a rule, it is unprofitable to continue his service. He is considered to have habits and traits of character undesirable for military service and administrative channels for his separation are provided under AR 615-368. It is interesting to note that civilian authorities have had no better success than the Armed Forces in salvaging or altering the pathological personality. However, in civilian life abnormal individuals have less restriction which allows them to continue their non-effective and abnormal behavior relatively unnoticed except when their activities are

of a criminal type.

SUMMARY: This article is concerned with the function and responsibility of the medical officer in the matter of ineffective soldiers who are not disabled by physical or mental disease. The basic causes and mechanisms of the various types of non-effective individuals are outlined. It is reiterated that the

medical officer is required to give support in the form of recommendations to the line officer for handling and disposition of such referred individuals. The medical officer is not responsible for the accomplishing of remedial or administrative action and should not utilize medical facilities for the removal and disposition of the non-effective soldiers.

BLAST CONCUSSION

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MECHANISM OF BLAST: To appreciate properly the manner in which the brain may be injured in proximity to the discharge of high explosives, other than by shell fragments, one should understand something of the mechanism of the concussive force. As the explosive detonates, there is produced an abrupt elevation in pressure that is transmitted outward from the center of the explosion. In the immediate vicinity, or "zone of brisance", everything is disintegrated. Beyond this, in gradually diminishing force, the particles, in whatever medium is being traversed by the wave, are oscillated about their equilibrium points. In passing from one medium to another, velocity is altered and surface particles may be disrupted. For example, when passing from air to the human body, tympanic membranes or respiratory mucous membranes may be ruptured. As this shock wave passes through the brain and its surrounding structures, the effect may vary from frank concussion, multiple petachial hemorrhages, or to a simpler neuronal trauma ("commotio cerebri") that is without detectable pathological alteration. As the wave decreases in force and destructiveness, it is recognized as sound. Its final characteristic is a reversal in pressure gradient.

Accompanying the shock wave is an intense wind with propulsive power. This may, through acceleration and rotation of the head, cause further injury by shearing stresses within the brain. Finally, the head may suffer from the impact of hurtling or stationary objects.

In the Korean campaign, concussion grenades and mortar shells have produced explosive effects of less magnitude than those of the second World War. This has afforded a greater clinical appreciation of the simpler or less complicated forms of cerebral injury from blast concussion.

CLINICAL PICTURE: Among combat personnel, many have experienced minor effects from blast without the need for medical aid. They see and hear the explosion, are momentarily dazed and suffer a transient headache. Others with somewhat greater injury, see but do not hear the explosion, have a momentary loss in consciousness and suffer a more troublesome headache. These cases are evaluated at battalion aid stations and promptly returned to duty. Those with a more protracted loss in consciousness and sequelae of a more troublesome nature are evacuated to a base hospital in Japan. When seen at the latter facility, four to fourteen days after injury, one gains the following concept of the development and course of the symptoms and signs:

Loss in consciousness: Concomitant with the explosion, its duration extends from a few minutes to approximately two hours. Upon recovery there is

a short period of cloudiness or difficulty with cerebration. There may be a partial resumption of usual tasks.

Amnesia: Retrograde loss extends from a few seconds to approximately fifteen minutes prior to the blast. Anterograde, or post traumatic amnesia, extends from a few minutes to approximately three hours.

Tinnitus: With recovery of awareness, the first sensation is an intense ringing in the ears. This rapidly diminishes over the next several hours and is of no consequence after a few days.

Epistaxis or Hemoptysis is experienced by a few.

Headache: Within a matter of hours there develops a generalized, bursting headache that reaches its peak in one to two days. This is accentuated by change in position and loud noises. It declines in severity, and after a week is intermittent. After two weeks, it is of little concern.

Nausea and Vomiting: Accompany the peak phase of the headache and subside with it.

Giddiness and some true vertigo is experienced during this period on sudden change in body posture. The giddiness, to a lesser degree, may persist for some time.

Restlessness, Irritability, Insomnia or Apathy: Exists in varying degrees for one to several weeks. Less common are battle dreams.

Physical examination, four to fourteen days after injury, reveals minimal signs. Most patients have slight incoordination; a few have hemorrhage into the tympanic membranes. Routine laboratory examination of blood and urine are negative. X-ray films of chest and skull are negative. Spinal fluid pressure and components are within normal limits. Electroencephalography shows a minor abnormality in one third of the patients. Psychometric evaluation reveals no significant abnormality.

There are two important deviates from this typical clinical picture. One or the other is reflected in a small minority of the patients. The first, disclosed through physical and laboratory examinations, is a more serious head injury. This will include cerebral contusion, more rarely subdural hematoma, and of especial interest, cerebral laceration from high velocity shell fragments that have entered with trivial scalp wounds.

The second, evident from clinical observation, is a prolongation of symptoms on a psychological basis. With the physical trauma there is a profound psy-

chological trauma. The degree of impairment from the latter will depend upon the combat experience and personality structure of the patient and the intelligence of the subsequent medical care. Some anxiety reaction is experienced by all patients. This generally subsides with physical recovery. In a few there is an extension of the initial period of unconsciousness or amnesia. A more common extension is that of headache. After the acute phase, as the typical head pain is diminishing, there develops a continuous, generalized, or bitemporal headache, of minor intensity, uninfluenced by anything. This occasions no distress when the patient is engaged in pleasurable activities, but is accentuated at the prospect of a return to duty. Rarely there is encountered a patient who has been subjected to multiple blast injuries with inconsequential physical effects, but with an incapacitating anxiety reaction.

MANAGEMENT: This is primarily one of sound supportive care. The attitude of the medical personnel and ward atmosphere must convey to the patient from the beginning that although he has a head injury, the nature of it is understood; that such injuries are reversible in a short time and that they are not a

contraindication to a return to duty. A thorough examination, with an explanation of the various procedures and the significance of negative findings, does much to reassure the patient. No narcotics are given for head pains. A.P.C.'s are prescribed for mild headache. For severe pain, Caffeine Sodium Benzoate, 0.5 gms intramuscularly, has proved beneficial. Early ambulation is insisted upon. While there is respect for the patient's tolerance, daily progress is expected. Recreation is encouraged.

DISPOSITION: The great majority is returned to duty within two to three weeks.

A minority is referred to psychiatry or neurosurgery for special care.

CONCLUSION: Brain injury from blast concussion is a true clinical entity. In the present military operation, the physical injury to the brain is of minor importance; however proper medical evaluation and management is of major importance for the recovery of combat personnel, the prevention of disabling psychiatric sequelae, and the detection of more extensive brain damage.

STATES OF ALTERED CONSCIOUSNESS (FITS AND FAINTS)

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A common diagnostic problem which confronts the medical officer in this command concerns those individuals who are referred because of a periodic loss or alteration of consciousness with or without convulsive movements. Such patients complain of "black-out spells", "passing out", "fainting or fits". Sel-dom is there an objective description of the unconscious episode nor can a reliable witness be found to give such an account. This is particularly true when individuals are evacuated a great distance from their units rendering impossible the obtaining of a pertinent history from other members of the group. The patient's story of what transpired is necessarily vague, both in organic unconscious states and those arising from emotional causes.

In our experience in the FEC, covering a six months' period from February 1951 through July 1951, 40% of such syndromes observed proved to have a true convulsive disorder, while the remainder proved to be of emotional or vasomotor origin. These results which were obtained in general hospital type installations in Japan do not necessarily apply to cases seen at dispensary, aid station or hospital in Korea. It is logical to assume that only the more severe cases are evacuated to Japan for further study, whereas individuals who demonstrate a lesser degree of syncope or transient state of altered consciousness are returned to duty by the forward echelons of medical service.

Because the above syndromes present a diagnostic challenge, it is believed pertinent to review our clinical material for the past six months in the hope that a more systematic consideration of such complaints can be demonstrated to be of value to the medical officer.

CONVULSIVE DISORDERS

In civilian life, one out of every two hundred persons is subject to convulsive seizures. The peak in

the age of onset is about the time of puberty, but the incidence of individuals who have their first seizure in the late teens and early twenties is still quite high. Many persons with established seizures are inducted without detection. In part, this may be attributed to the lack of physical signs in epileptic patients, their strong desire to qualify for the service, and ignorance of attacks that occur only during sleep. Many have their first seizure after entering military service. For these reasons, it is not surprising that the convulsive disorders constitute a formidable problem within the Armed Forces.

MECHANISM: The basic mechanism in all of the epilepsies is a sudden, excessive, neuronal discharge within the cerebrum. This paroxysmal dysrhythmia has been given clearer definition by the relatively new technique of electroencephalography. Exactly why the unruly cerebral activity takes place is not understood, but two predisposing factors are worthy of attention, namely, an inherited tendency and organic brain disease. A familial history was obtained in about a third of our cases. In a similar but not necessarily concomitant number, there was some indication of brain damage, with resultant focal seizures. The etiology of the structural cerebral change is not always determined, but the most common cause is trauma which may occur at birth or later in childhood, adolescence, or adult life. Much less common is infection involving the brain and its coverings with its sequela; rare is cerebral neoplasm. There are several precipitating factors - transient phenomena which serve only to initiate the seizure; these include alcoholism, fatigue and emotional stress. As an inciting agent, alcohol is more common in patients from support or non-combat units, whereas excessive fatigue and emotional stress are the most frequent precipitating factors in individuals from the combat zone.

CLINICAL TYPES: Grand Mal Epilepsy - this has been the principal type in two-thirds of our cases of epi-

lepsy. The main component is a major, generalized, convulsive seizure. Subjectively the patient may or may not experience any warning. Common examples of such prodromal warning sensations are vague epigastric discomfort, a queer feeling in the head, or a sense of panic, then consciousness is abruptly lost. With recovery there is momentary confusion, severe head pain and profound drowsiness. Frequently, the muscles of the back are sorely fatigued. There may be nausea and vomiting.

Objectively, the person is seen to freeze in whatever he is doing. He may call attention to himself by an unusual cry. The face is expressionless. The eyes stare or roll upward. He will not respond to questions. The body stiffens - with this he falls. The face is blue, red, or mottled. Respiration is labored. There may be froth at the lips, and finally there follows generalized clonic movements. With these the tongue may be bitten and sphincter control of the bowel and bladder lost. The movements gradually subside. Breathing returns to normal and color is restored. In 5-30 minutes awareness is regained. The frequency of seizures varies within wide limits. The duration of individual seizures is from one to several minutes. While a given patient's attacks are relatively constant in pattern, a part of the seizure rather than the whole may be experienced. There may be simply a warning, or a brief loss in consciousness with a transient increase in muscular tone. Such fragments are a minor expression of the grand mal type and should not be confused with the petit mal variety of epilepsy.

FOCAL EPILEPSY: One-third of our convulsive disorders were in this category. The main components of a focal seizure are unilaterality in onset and, in most instances, a delay in the loss or alteration in consciousness. The pattern of the seizures is dependent upon the site of the irritative brain lesion. A typical Jacksonian seizure has its origin in the motor strip of the cerebral cortex (pre-central gyrus). If the focus is in the hand area of the motor cortex, the seizure will start on the opposite side of the body with rhythmic movements of the fingers in which the clonic component is dominant. Then the movement will spread to the wrists, the elbow, the shoulder, and the leg on the same side. As the rhythmic movement pattern crosses the mid-line of the body consciousness is lost and a generalized convulsion ensues. The latter is indistinguishable from the clonic phase described in the preceding section. The attack may stop at any point along this "Jacksonian March." Similarly, if the focus is in the hand area of the sensory strip of the cerebral cortex (postcentral gyrus), the seizure will start with a peculiar sensation in the hand. One patient compared his with a feeling like shriveled leather. This sensation will spread in the same manner as that described for the motor phenomenon. The maximum result, again, is a generalized convulsion. If the focus is in the pre-frontal area anterior to the motor strip, the seizure will start with the turning of the eyes and head to the opposite side of the lesion. This is accompanied by rapid loss of consciousness. When the focus is in the occipital area, the onset is heralded by a gross visual sensation, as a blinding light, in the opposite visual field. If the focal cause is in the temporal lobe, the onset may be recognized by vertiginous or auditory sensations, but if located in the anterior temporal lobe, there may be produced seizures that are designated as the psychomotor type. There are two main variations of this type. The first consists of automatic move-

ments. These may be simple or complex. A patient may fumble with his clothes, another may suddenly run for almost a block. The second psychomotor expression is composed of psychic phenomena. A strange place or happening may appear familiar. Objects may appear too large or too small. A bar of music may be heard or a scene envisioned. Whatever the character of the seizure, it is usually stereotyped and with a recurrence of the seizure, the same experience is repeated. Not infrequently psychomotor seizures are preceded or accompanied by a smacking of the lips. Consciousness may be altered rather than lost. Some of the things that happen during a seizure may be remembered. Admittedly, this last category is the most difficult to recognize. Of aid in the diagnosis is the smacking of the lips and the repetitious nature of the automatic movements or the psychic phenomena. Many of these cases at some time will have had a major generalized seizure. However, in our experience in the Far East Command, the psychomotor type of epilepsy is rare.

The importance of focal seizures as a symptom of an expanding brain lesion should be a warning signal even though cerebral neoplasms are rare in the military age group. One such case was a 20-year old boy whose presenting complaint was a recurrent adverse seizure in which the eyes and the head turned to the right. Evaluation revealed that the basis for the seizure was an astrocytoma.

PETIT MAL EPILEPSY: This has not been seen among military personnel in the FEC. Essentially, it is a disorder of children with the main component being a brief lapse in consciousness, attended by the slightest of muscular movements, seldom more than a rhythmic blinking about the eyelids. Exclusive of the unusual akinetic or myoclonic variants, such seizures do not produce falling. Commonly, there is only an interruption in activity with a brief stare. This may occur several to hundreds of times a day. The duration of individual seizures is a few seconds. It is easily precipitated by hyperventilation. It tends to disappear, or be supplanted by grand mal attacks in the mid to late teens. Rarely does it extend with or without grand mal episodes into the third decade.

The electroencephalogram will reflect in all types of epilepsy the particular disordered neuronal activity which is present during the described seizures. In between attacks, a significant abnormality of the EEG will be found in 70 to 80% of the cases. This is a valuable supplement to the usual diagnostic methods. In 15% of the cases, the EEG provides the critical data without which the diagnosis of a convulsive disorder cannot be established.

From the preceding, it should have been made evident that the most important single factor in the evaluation of a convulsive disorder is an accurate history. Extra effort should be put forth to obtain an objective report of what happened while the patient was unconscious. Close attention should be paid to the subjective experience just prior to and immediately following the unconscious period. To this should be added a careful physical examination and the use of those laboratory facilities that are available, such as routine blood and urine examinations, X-rays of the skull, spinal fluid examination and electroencephalography. Protracted observation is impractical and should not be required.

MANAGEMENT: The gravity of the diagnosis of epilepsy should be considered. Once made, the patient's military status is immediately altered. His future

in civilian life is made more difficult, and he is committed to continuous therapy. The incidence of a single seizure, though it may be an authenticated, major, convulsive episode, without other abnormality and without family history, does not warrant the diagnosis of epilepsy. Only with the recurrence of seizures is the diagnosis tenable.

If evacuation to the ZI is to be effected, we employ phenobarbital 0.2 gm to 0.4 gm a day for some measure of protection without fear of toxic reaction, until the patient may receive a more definitive choice and adjustment of anticonvulsant medication in the United States. For the mild cases that are returned to duty (Army), Dilantin Sodium, 0.3 - 0.5 gms a day plus phenobarbital 0.1 gm before sleep are the drugs of choice. Alcohol, driving vehicles, climbing in high places, swimming alone, and other hazardous pursuits should be prohibited.

Status Epilepticus is a serious state in which one seizure follows another without an interval of full recovery. In an effort to interrupt this pattern, we have employed Sodium Phenobarbital, 0.4 gm, by vein, with repetition once, in one hour, if necessary. An alternate procedure is the maintenance of light Pentothal anesthesia for 24 to 36 hours. Attention should be paid to fluids and nutrients, the respiratory passages, and the supplementary use of oxygen.

With the increase in younger age dependents in the FEC, appearance of petit mal epilepsy is possible. Tridione is considered to be the most useful drug available for this type of epilepsy, but has no place in the treatment of the major, minor and focal seizures described above.

Sympathetic support should be employed in acquainting the patient with the diagnosis and in the establishment of the therapeutic regime in order to insure that morale is not shattered.

SYNCOPE

Syncope is found in 60% of the cases from combat and support units who were hospitalized because of recurrent alteration in consciousness. The types seen fall into three main, and a scattering of less common, categories. For clarity they will be discussed separately in order of their frequency, under the heading of their principal causative mechanism.

VASODEPRESSOR SYNCOPE: Most cases of this type are admitted from combat areas. In a setting of danger, real or imagined, the organism prepared itself for "fight or flight." If neither is possible, and the expression of fear is inhibited, there may be a fall in arterial blood pressure with transient cerebral anoxia. The resultant clinical picture includes: a sense of muscular weakness, giddiness, sweating, nausea, blurring of vision and loss in consciousness. The patient slumps to the floor, limp. He may hurt himself in falling, but there is no tongue biting or incontinence. The pulse is rapid and weak and the blood pressure is low. The face is pale. Recovery of conscious is effected in 15 to 20 seconds, rarely longer. With awareness regained, a feeling of weakness, cold sweat, and perhaps nausea, will persist for several minutes, but there is no headache or drowsiness. This type of reaction can occur in anyone if subjected to overwhelming danger or severe pain, but in many of our patients there was a history of repeated fainting in childhood or early youth followed by a free interval and than a recurrence under the stress of combat. Commonly, other members

of the family, particularly the mother, were subject to a similar syncopal attack.

A not infrequent variant of this type is the person, overly concerned about his body with an exaggerated fear of mutilation, who faints upon trivial wounds or minor surgical procedures.

ORTHOSTATIC HYPOTENSION: This is more commonly seen in patients from support units rather than combat areas. The mechanism is a transient postural hypotension. Upon suddenly arising from a reclining position, the patient complains of faintness, giddiness with momentary "black out", but seldom a fall. Recovery is hastened by reassuming the reclining position. Although such a history is not uncommon, it is usually of little importance. Often the examiner is led to believe that the patient is giving maximum expression to minimal symptoms.

HYSTERICAL FAINTING: In a dissociative reaction, secondary to emotional stress, a person may appear to lose consciousness, but the clinical picture is distinct from that in which vasodepression or orthostatic hypotension play a part. This is no prodromata of weakness or giddiness. The loss in consciousness is rarely complete. Upon close questioning, the patient will recall that he was "dimly aware" of noises around him, of being moved and of what was said. When he falls there is no evidence of injury. Change in position does not alter his symptoms and the color will remain throughout. Respiration, pulse and blood pressure show no significant alterations; incontinence does not occur. If an EEG is taken during the episode, the findings do not demonstrate dysrhythmia. The apparent coma may alternate with crying and thrashing about. Often there is exhibited a purposefulness in such a struggle. The attack will be appropriately staged in the presence of others and may last from a few minutes to several hours. Upon recovery, the individual does not appear weak or drowsy.

Much less frequent has been the appearance of the hyperventilation syndrome in which through induced alkalosis there is numbness and tingling in hands and feet, giddiness, confusion and possibly a loss of consciousness. Recurrent syncope from hypersensitive carotid sinus, heart block or hypoglycemia is rarely seen in the military setting.

EVALUATION OF SYNCOPAL ATTACKS: An accurate history is essential. This should include the setting in which the syncope took place. The objective signs that the patient exhibited at that time and his subjective experiences are of primary importance in establishing the diagnosis. An evaluation of the personality structure should be obtained if possible with special emphasis on his patterns of reaction under stress or pain. The physical examination should pay especial attention to the cardio-vascular system for any organic defects, response to alteration in posture, and the question of carotid sinus sensitivity. In addition, hyperventilation for 3 minutes may produce a typical attack. Routine laboratory procedures should be supplemented by blood determinations for sugar, potassium and calcium content. If available, an EEG should be obtained.

CONCLUSION: In the Far East Command, major, minor and focal convulsive seizures and the more common forms of syncope are seen. Each is more prone to recur under the stress of combat experience, but may occur elsewhere in military service. Each requires accurate differentiation for correct diagnosis and management.

HEADACHE

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Headache is one of the common subjective complaints among unwounded patients of the Korean campaign. It may be that this current battle action which has been figuratively at least, a headache to most, has translated itself by reason of the tension involved, into a literal symptom. At any rate the presenting, or associated complaint of headache, strains the diagnostic resources of all medical officers whether they be stationed in a forward unit or in a rear hospital. This paper has for its goal the elucidation of the many causes of headache including practical procedures in their treatment and management.

From close clinical observation and experimental study it has been determined by Dr. Harold Wolff and his co-workers, that the following head structures are pain-sensitive.

Extracranial: The arteries and other soft tissues of the scalp, the pericranium, the muscles of the scalp and upper neck.

Intracranial: The major venous sinuses and their tributaries from the surface of the brain; the dural arteries, the arteries at the base of the brain and the dural floor of the anterior and posterior fossae. The demonstrated mechanisms of the production of head pain are multiple but those of especial interest to us are:

- a: Traction upon intracranial structures,
- b: Dilation of intracranial and extracranial arteries,
- c: Contraction of skeletal muscles of head and neck.

In any given case more than one of these mechanisms may be involved. In all the underlying personality structure is of importance; in many it is the dominant factor.

The types of headache that have been of particular concern in the Far East Command are the following:

TRAUMATIC HEAD PAIN: By this is meant headache as a direct result of recent trauma. Headache due to blast has been discussed elsewhere in this symposium. In patients with penetrating wounds of the brain, headache is seldom a prominent symptom. In part, this may be due to the associated altered state of consciousness usually present prior to operative repair. When questioned specifically, most patients of this type declare that they have head pain, but make little of it. Excepted are the cases with low temporal wounds that involve extracranial muscles, and post-operative patients who have developed such complications as abscess, herniation or epidural hematoma. In these exceptional cases, the pain may be intense of a non-throbbing character and intermittent in type. This pain is accentuated by quick head movements, coughing or straining. The mechanism involved is most likely due to traction on intracranial structures. Correct management is primarily the treatment and the prevention of the complications of penetrating wounds of the head. Therapy for the headache should not be employed until a thorough evaluation of the wound is complete. For symptomatic relief the simple analgesics, codeine and intravenous hypertonic glucose may be of value.

MIGRAINE: We have limited this diagnosis to patients with most of the following clinical criteria:

a: Prodromata of visual disturbance, as blurring, scotomata, or hemianopsia. Some of our patients have had paresthesiae as well.

b: Throbbing headache, unilateral in onset. Rarely does this remain localized to one region, but spreads to involve the entire head and neck. Usually one side will predominate as the site of origin. If the head pain has always started on the same side, a more extensive search is made for an organic defect.

c: Nausea and vomiting. This occurs after several hours, at the peak of the head pain.

d: A history of migraine in the immediate family. This is most commonly found in the mother.

e: Rigid, ambitious personality.

f: Recurrence under stress. A most common history is that of typical attacks in childhood or early youth, a relatively long period without discomfort, and a recurrence under stress or combat experience.

The mechanism of the prodromata is generally believed to be that of vasoconstriction of the cerebral arteries, with the headache secondary to the subsequent dilation of the cranial vessels particularly those along the distribution of the external carotid artery. After the headache is induced by the above causes, it is often continued owing to an associated sustained contraction of the scalp musculature.

The symptomatic management is directed towards the interruption of the course of the illness in the prodromal stage. When the headache is well established, therapy is of little avail because of the extended and edematous vascular walls and the secondarily excited muscle spasms. Ergotamine tartrate is the drug of choice in the prodromal stage. We have found an effective mode of administration to be a dosage of 2 mgm. orally, at the first symptom with 1 mgm. every half hour, not to exceed a total of 6 mgm. Currently, we are also using 100 mgm. of Caffeine Sodium Benzoate with each 1 mgm. of Ergotamine tartrate. In our series there were 2 cases who could not tolerate the Ergotamine preparation but obtained relief with 0.4 gm Caffeine Sodium Benzoate, intramuscularly. Caffeine Sodium Benzoate orally is seldom effective alone. No formal psychotherapy has been employed in our migraine patients, except that of reassurance and explanation. With this regime of drug therapy and management, the majority of our patients have been returned to duty.

Other vascular type headaches of a less typical character have not responded as well to the symptomatic use of ergot derivatives. The so-called histamine headache and the syndrome due to temporal arteritis have not been seen by us although they are not infrequently diagnosed in the forward areas and evacuated for treatment.

PSYCHOGENIC HEADACHE: Headache is one of the manifold expressions of anxiety and as such is one of the most frequent and frustrating of symptoms to treat successfully. We are called upon to handle many individuals with headache who would not ordinarily be seen by a physician in civilian life. This is because situational frustrations can be altered by the

individual thus rendering unnecessary a consultation with a physician. Moreover, the civilian may well understand that the headache is a minor symptom which accounts for the large amount of aspirin and other remedies consumed in the United States. In the military life there is a common tendency to use headache as well as other symptoms in order to withdraw from the demands of the service.

The personality under the stress of service life whether in peace or war must function effectively. If distress or danger is too great for the individual to handle then there is aroused an unconscious need to avoid this threat. In our society it is not acceptable to run from danger under combat conditions. This results in a conflict from which anxiety is inevitable. Because the subjective sensations of anxiety are difficult to bear it is common for individuals to displace this feeling to the autonomic and other unconscious nervous system mechanisms which reflect the tension in an altered manner as it acts upon blood vessels or muscles. It is then that the vascular or tension headache is manifested. If the medical officer recognizes that the majority of headaches are emotionally determined much valuable time and effort could be saved and expensive and useless laboratory procedures avoided. There are two common clinical syndromes of this type encountered among service personnel, namely, those due to suppressed and repressed anxiety which cause the tension or vascular headache and the headache complaints of individuals with immature and unstable personalities.

TENSION AND VASCULAR HEADACHES: This is a smaller group of the psychogenic headache that occurs in patients who in general are effective in the usual performance of their duties. Such cases usually present a picture of situational stress which coincides with the initiation or aggravation of their head pain. When the stress is severe or continued, the headache becomes worse. Generally, they are relatively free of head pain prior to some unusual or continuing environmental threat as encountered in combat. The headaches in this type are mainly cervico-occipital in location and sometimes are referred to as cervical myositis. Frequently scalp tenderness is noted on palpation or when the individual wears a steel helmet. Usually, the headache becomes worse during the day when under the stress of the exact performance of duty or a demanding job that strains their capabilities. Another pain distribution is the diffuse aching of the frontal or vertex region of the head which is considered to be of vascular origin. Relief from stress is often sufficient to alleviate the headache. The underlying personality involved in this type of case is that of the overly conscientious compulsive person who needs to drive himself and accomplishes the continuation of duty at the cost of great emotional and physical dissipation. This type of individual is usually aware of the effects of tension and emotional strain upon the production and exaggeration of his symptoms. Generally he is well-motivated and adjusts quite well to the demands of authority, but the anxiety aroused by his stressful situation cannot readily be externalized by aggressive action on a conscious level and is therefore channeled into the psychogenic headache. It is often expedient to remove individuals with such persistent headache syndromes from the

combat zone for a short period of rehabilitation and rest which is often sufficient to enable them to return to duty. It is not uncommon to find individuals of this type in executive positions of support or headquarters unit where there is a constant demand for continued effort in planning and operations. When evacuated to Japan, patients of this type are greatly benefited by brief psychotherapy in a setting of convalescence and rehabilitation found at the convalescent hospital. Mild analgesics, occasional vasopressor drugs, mild sedation and physiotherapy are good therapy adjuncts, but the treatment of the symptoms alone is of little value. The handling of the emotional problem must be the primary objective. Ventilation of emotion with a permissive sympathetic interviewer and the reinforcing of group identification are basic factors in such a brief psychotherapy. In such a convalescent center, the secondary gain of evacuation to the ZI is eliminated and the firm orientation of the patient towards eventual return to duty is fostered. Treatment is usually accomplished in 10 to 30 days of therapy. A larger period of time may be necessary in the more severe cases. It is rare that symptoms in this type are so severe that evacuation to the ZI is necessary.

PERSONALITY DISORDERS ASSOCIATED WITH HEADACHES: The larger group of emotionally determined headaches come from individuals with varying degrees of immature and unstable personality integration. Such persons exhibit fluctuant emotional relationship in all spheres of adjustment. Headache is only one of the protean manifestations of their basic intrapsychic difficulty and the subsequent inadequate ability to face life's problems and function as an adult. The most prominent feature of this personality dysfunction is an exaggerated passive-dependent receptive need. Marked hostility is aroused by the frustration of separation from an overprotective family or a maternal wife. There is a general instability in any situation that demands a responsible adult performance, manifested by anger, when the person finds that he is unable to meet this environmental demand. Hostility is common and readily recognized. When seen in the hospital such individuals are sullen, uncooperative, demanding and complain bitterly that no one does anything for them. Their headache is usually of a constant bitemporal and frontal distribution which may become diffuse and caplike. Seldom is relief furnished by drugs. They state that they feel better when lying down but when not on duty the headache is apparently unnoticed as they engage in pleasurable activities. It is almost as if the mere mention of work or duty exacerbates their symptoms. Treatment of such cases is a difficult problem at best. In the main, individuals of this type should not be allowed to use medical facilities as a crutch. They should be firmly returned to duty when evaluation indicates that there is no objective evidence of incapacity despite their subjective statements of pain and discomfort. Extensive procedures such as spinal puncture, pneumoencephalogram, EEG and skull x-rays only serve to fix the infirmity and should be avoided where possible. Supportive psychotherapy is effective only when the patient shows some degree of maturity and good motivation. When the defective personality integration is severe as indicated by repeated hospitalization with avoidance of duty, administrative measures should be recommended. This is predicated on the fact that a severe personality disorder exists rather than an illness.

INTRODUCTION:

To our lay society and fighting men, the enigma of the "poor aching back" is well-known, and the physician's dilemma, in this regard, is equally well-recognized by patient and doctor alike.

In the Far East Command, backache presents a major problem faced daily by physicians in nearly every medical specialty at all levels of medical care.

At the Tokyo Army Hospital, large numbers of patients examined presented the chief complaint of backache with and without associated leg pains. The majority of these patients came from military units and organizations actively engaged in combat, or from installations directly in support of tactical units. Almost without exception they were referred here with the diagnoses of some type of organic disease, and yet it became increasingly apparent, in a large percentage of these cases, that objective evidence of significant organic disease was sorely lacking. It seemed worthwhile therefore to report our experiences with a considerable number of patients with backache in the hope of clarifying some of the problems of diagnosis and management.

PRESENT STUDY:

The clinical records of 122 patients seen in this hospital in a five month period, from November 1950 through March 1951, were reviewed. These patients were studied on the Medical Service and represent the consecutive cases observed during the above period by seven medical officers¹ in addition to the authors. During this period patients suspected of having a herniated nucleus pulposus, lumbosacral strain, myofascial syndrome, sacro-iliac joint strain, sciatica, arthritis, and congenital abnormalities were admitted to the Medical Service. Many of these patients would have been referred directly to various other specialties such as Neurosurgery and Orthopedics, but because of the heavy patient load carried by those services and an interest in backache on the part of the Medical Service, they were studied and treated by the internists. This afforded a unique opportunity for seeing a wider spectrum of disease than would ordinarily be encountered on a general medical service.

In the group of patients thought to have no organic disease, specific psychiatric diagnoses were not always made. For the purposes of the tabulation they have been classified as "No Organic Disease Found". This group of cases was sub-divided, however, into two groups: (1) Those with a history of acute trauma or strain immediately preceding symptoms and (2) those with no history of acute trauma or strain immediately preceding symptoms.

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METHOD OF EXAMINATION:

The diagnosis was made in each case by a careful history, physical examination, and a minimum of laboratory study. Each history included a detailed analysis of the chief complaint and associated symptoms. Special attention was paid to the onset and duration of the illness. The influence of various physical and emotional factors and the appearance and severity of symptoms was noted. An attempt was made to ascertain how strong was the patient's motivation for recovery. A detailed review of systems was employed. Family and social histories were recorded.

Physical examination included specific tests designed to determine the functional integrity of the spine and associated structures. The general contour of the low back, including the degree of lumbar lordosis and/or scoliosis was noted. The patient was instructed to bend over and touch his toes with knees stiff. He was asked to flex laterally, forward flex, and extend his spine. Hip joints were flexed, extended, and rotated. Stress was applied to the sacro-iliac joints. Straight leg raising was performed with the patient lying and sitting. The sciatic notch region was palpated. A rectal examination was done. Neurological examination included the testing of gait, motor power, reflexes, and sensation. The usual blood and urine examinations as well as a blood sedimentation rate were done on each patient. X-rays were taken of the involved parts and a lumbar puncture secured when specifically indicated by the presence of neurological symptoms or signs.

RESULTS:Organic Disease:

The diagnoses were tabulated in table #1. Definite evidence of organic disease was found in 47 patients, or 38.5%. Some of these patients gave histories and displayed findings suggesting the presence of an associated neurotic illness. These people were classified as having organic disease even though such a neurotic factor, which may well have been responsible for the severity of symptoms or disability produced by the illness, was present. Patients with backache and certain congenital abnormalities such as spina bifida occulta and sacralization of the 5th lumbar vertebra but excluding spondylolisthesis were considered to have no organic disease. These conditions exist so commonly in asymptomatic individuals that serious doubt is cast on their ability to produce symptoms. Moreover, most of these patients presented some positive evidence of a neurotic illness.

Each of the following organic diseases, presenting with the chief complaint of backache was encountered once: juvenile epiphysitis, traumatic arthritis, structural scoliosis (secondary to an old shortening of one leg), acute seminal vesiculitis, poliomyelitis, and an acute pilonidal sinus infection. Two cases of compression fracture and six cases of typical rheumatoid spondylitis were seen. The criteria for diagnosing these conditions are well known and will not be defined here. In most instances their diagnoses presented no problem, and they were treated in the generally accepted manner. Except for the cases of pilonidal sinus infection and acute seminal vesiculitis who were returned to full duty on recovery, all cases with organic disease were evacuated to the ZI

for further care and final disposition.

Ten patients were diagnosed as having their symptoms secondary to acute trauma or musculoskeletal strain of the low back. This diagnostic category was set up to include those patients who, for the most part, were stable, well-motivated and non-neurotic individuals. They gave a well-documented and clear-cut history of significant trauma, associated with local bruising, tenderness, splinting of the back, and had no specific neurological or roentgenographic abnormalities. On conservative management, with bed rest and physiotherapy, they recovered and lost their symptoms in a matter of a few days to a few weeks. In general the pattern of their symptoms and signs coincided well with the pathology of an acute musculoskeletal bruise or strain. All cases were returned to duty, and accepted their disposition, without serious objections.

The greatest confusion in differential diagnosis arose in relation to the syndrome of the herniated nucleus pulposus. Twenty-three patients, or 18.9% of the 122 patients, were seen with a typical history and findings of a herniated nucleus pulposus. Each individual in this group had at least one of the following signs in addition to a classical history of root irritation: (1) Localized muscular weakness. Weakness of the glutei and long extensor of the great toe was most commonly seen, (2) diminution or loss of a tendon reflex, (3) sensory changes consistent with a dermatome distribution, and (4) elevation of the cerebral spinal fluid protein. Reliance on these signs was found necessary. Frequently patients in whom no organic disease was found -- more specifically, cases of hysteria without the objective paralytic and anesthetic stigmata -- presented rather convincing histories of root irritation. The explanation for this similarity in the histories was felt to be iatrogenic in most instances. That is to say, suggestible individuals who had been questioned many times on specific diagnostic features of their illness by several physicians in the chain of evacuation subsequently incorporated these points in their own stories. For example, they would be asked, "Do you have shooting pains in your legs?" or, "Does your pain have any relation to coughing, sneezing, or straining at stool?". Evidence tending to support the view that additional symptoms were frequently grafted upon the basic complaints in suggestible individuals was found when negative statements in previous histories regarding their symptoms were compared with the later positive statements in which such symptoms were said to have preceded in time the earlier recorded histories. Frequently these subjective features were volunteered in a stereotyped fashion suggesting that they have been acquired by rote. Some patients with typical textbook complaints gave the history of past association with patients having a root irritation syndrome. The importance of this source for symptoms is more speculative, but tended to raise in us a high index of suspicion. Evidence tending to support the contention that such subjective complaints are unreliable is seen in discouraging results recorded in the literature of many competent neurosurgeons who, in the past, have frequently found no herniated nucleus pulposus when explorations were performed on Army patients with subjective disc symptoms alone. In such cases, the patient's symptomatology was not significantly altered, and he was provided with indisputable evidence of organic disease.

Ancillary signs used in the diagnosis of a herniated nucleus pulposus such as flattening of the lumbar

lordosis, scoliosis, limited straight leg raising, increased radicular pain on jugular compressions, tenderness over the sciatic nerve and narrowing of the appropriate vertebral interspace were at times helpful but less reliable than the four listed above. If a constellation of these were present in a stable, non-neurotic individual who presented a good history, although without objective signs of root compression, the diagnosis of herniated nucleus pulposus was strongly suspected. He was then treated for a few weeks on bed rest, bedboards and flexion exercises. If he responded with marked improvement on this regime, then the probability of organic disease -- more specifically, herniated nucleus pulposus -- was strengthened. Several patients in this group were returned to duty. For the purpose of tabulation in this report they were included under the heading of "Etiology Not Determined". Because of the iatrogenic implications care was taken to withhold the possible diagnosis of herniated nucleus pulposus from the patient.

Management of the group with good objective evidence of a herniated nucleus pulposus was also conservative. If the objective findings persisted the patient was evacuated to the United States for more prolonged observation, evaluation, treatment and possible neurosurgical intervention. A few of these patients made startling and complete symptomatic recoveries, lost their objective signs and were returned to duty. Such patients accepted this duty disposition without complaint in contrast to a high percentage of those in the non-organic group who denounced their physicians privately and publicly for such an injustice.

No Organic Disease Found:

No compelling evidence of organic disease was found in 66 of the 122 patients, or 54.2%. Thirty, or 24.6% of the total group, reported trauma or strain prior to the development of their complaints. This varied from such insignificant precipitating factors as lifting a nine pound rifle or being struck in the back by a small stone, to trauma of such magnitude as being thrown "fifty feet" by a blast or being pinned beneath a three-quarter ton truck. Some patients immediately became "paralyzed all over", "numb from the neck down", "blind", or developed other hysterical symptoms associated with "mashing", or "tearing pains" in the back. Others merely developed back pain. Often the patient gave a history of freedom from symptoms for the immediate post-traumatic period only to develop the severe back pains hours, days, or even weeks later. Some patients were evacuated immediately while others made repeated sick call visits before convincing the medical officer of their need for hospitalization. Despite the often dramatic nature of the histories we were impressed by the paucity of valid objective signs here or at any point in the medical evacuation. The incongruous nature of the neurological findings in hysteria as compared to subjective complaints offered little diagnostic difficulty. A "touch-me-not" attitude was common when the back was examined. More specifically, a superficial or light touch over the back in any area would elicit marked withdrawal and painful grimaces. With patience and reassurance a more thorough examination was possible. None showed any external evidence of trauma, such as ecchymosis or abrasion that would be expected from the history. Muscular spasm of paravertebral muscles was occasionally found. Rarely was scoliosis seen. More often than not the patient could perform all back maneuvers without restriction, although encouragement and reassurance were frequently necessary. Straight leg

raising with the patient in the supine position was sometimes thwarted by hamstring spasms, and attended by marked grimacing and perspiring. However, with the patient in the sitting position extension of the leg to ninety degrees could be accomplished with ease although this maneuver places similar stress on the sciatic nerve. Neurological examinations and laboratory studies including spine x-rays were negative.

Characteristically, this group did not improve on bed rest and physiotherapy, but clung tenaciously to its complaints. Striking anxiety symptoms were commonly seen and often appeared to increase rather than decrease during the hospital stay. At the onset, no doubt, many of these patients had probably sustained significant trauma with resulting physical injury, but the functional incapacity, severity, and persistent nature of symptoms were far out of proportion to any organic disease. When one delved into their past and present personal histories, there was usually evidence of poor motivation with multitude of complaints such as dizziness, fainting spells, blackouts, anxiety symptoms, paralyses, paresthesias and headaches.

The group without organic disease and with no history of acute trauma anteceding the development of the present episode, often have a history of recurrent backache. Thirty-six patients, or 29.6% of the 122 patients fell into this group. Almost without exception these patients gave a history of long continuous suffering from low back complaints with frequent severe exacerbations seemingly timed with periods of emotional stress, disagreeable duty, or undesired assignment. They were "never free of low backache" which had often been with them for years. It is interesting that many insisted they had less pain when in a specific "climate", usually found near their home in the ZI. There was usually less overt anxiety apparent in this group. They frequently reported the details of multiple previous hospitalizations which were often of several weeks or months duration. Their histories were replete with such diagnostic terms as "ruptured disc", "pressure on the nerves", "sciatic rheumatism", or some form of congenital abnormality. Some had myelograms and a few an "exploratory operation."

Seldom did they report that they had been told no organic disease was found. Such fixed symptomatology invites the unwary examiner to consider seriously the diagnosis of a herniated nucleus pulposus. However, the validity of these statements was open to question and in some instances were certainly the result of misinterpretations and even untruths.

It is pertinent to mention at this point that not infrequently one or more physicians had the distinct impression that a patient was deliberately manufacturing his illness in a calculated manner, i.e., malingering. Such an impression was often hard to escape, especially when the obvious gains for the patient brought about by his illness are so great. This diagnosis was not made in this series of patients for undeniable proof of malingering was difficult to obtain.

Once the diagnostic studies were complete, individuals felt to have "No Organic Disease" were told the result of their examination. Detailed explanations of the origin of their pains were avoided. They were usually informed that psychological mechanisms, not structural disease, were the basis of their symptoms. The fact that they had pain was not denied, but it was insisted that they must live with the symptoms and return to duty since no medical disability existed. An attempt was made to be firm

but understanding. Although some patients accepted this fairly well, the prevailing attitude of most patients in the non-organic group was one of a refusal to accept the diagnosis, and unavoidable disposition. At this point, statements such as: "I don't understand it"; "There must be some cause of this pain"; "That's what all the doctors say"; or, "Pains are not in my head", were common. Many became quite aggressive and demanded that "something be done". On several occasions the physicians in charge felt that they were in real danger of physical assault, so marked were the hostile reactions. A few made formal complaints to the Inspector General.

All braces, canes, and similar appliances were denied the patients with no organic disease, except that occasionally a patient with an acute hysterical paralysis of the legs was allowed to use crutches for a day or so in order to make his recovery appear to progress at a reasonable rate and thereby save face for himself in the eyes of his ward mates.

The total final dispositions made in the non-organic group are recorded in table #2. Approximately 70% were returned to full duty, 20% to non-combatant duty, and 10% with the more severe neurotic symptoms were transferred to a psychiatric hospital for further treatment. How many will be re-evacuated to other hospitals is unknown, but to date less than half dozen have returned to this hospital after a 3 - 8 month period. There is no doubt that some will find their way back at a future date.

Patients of special interest, found in the non-organic group were individuals having a chronic tension state. Almost invariably, such persons were NCO officers who had excellent work records because of a compulsive and perfectionistic personality. Their presenting symptomatology was a chronic, annoying low backache, usually associated with muscular aching between the shoulder blades and at the base of the skull. This was accompanied by typical tension headaches. The muscles were tense and sore on examination and the symptoms responded exceptionally well to simple muscle relaxing devices such as massage and hot showers. This patient readily recognized the association of backache with the other anxiety symptoms and was quite willing to accept the emotional origin of this discomfort. He was relieved to learn that there was no serious illness and with this reassurance accepted a duty disposition considerably better than most others in the non-organic group.

In this study the clinical characteristics of the various disease entities which produced backache have been presented. Special emphasis has been placed on the differential diagnosis between the group of patients with and without organic disease. The problems of management and disposition have been discussed.

SUMMARY:

Backache has been a common medical complaint in the Far East Command during the Korean campaign. One hundred and twenty-two patients with the chief complaint of backache were seen on the medical service at the Tokyo Army Hospital during a five months period. Only 38.5% were found to have good objective evidence of organic disease.

T A B L E I

CLINICAL DIAGNOSES OF 122 PATIENTS PRESENTING ON THE GENERAL MEDICAL SERVICE WITH THE CHIEF COMPLAINT OF BACKACHE

<u>ORGANIC DISEASE</u>	<u>Number</u>	<u>Percentage</u>
Herniated nucleus pulposus.	23	18.9
Acute trauma or low back strain	10	8.1
Rheumatoid spondylitis.	6	5.0
Compression fracture.	2	1.7
Juvenile epiphysitis.	1	.8
Traumatic arthritis	1	.8
Structural scoliosis.	1	.8
Acute seminal vesiculitis	1	.8
Poliomyelitis	1	.8
Pilonidal sinus infection, acute.	1	.8
TOTALS	47	38.5
<u>NO ORGANIC DISEASE FOUND</u>		
History of trauma or strain immediately preceding symptoms.	30	24.6
No history of trauma or strain immediately preceding symptoms	36	29.6
TOTALS	66	54.2
<u>ETIOLOGY NOT DETERMINED</u>	9	7.3
TOTAL	122	100.0

T A B L E II

DISPOSITION OF 122 CASES OF BACKACHE SEEN ON THE MEDICAL SERVICE*

	<u>ORGANIC DISEASE</u>		<u>NO ORGANIC DISEASE FOUND</u>			
	<u>Number</u>	<u>Percentage</u>	<u>History of trauma or strain immediately preceding symptoms</u>		<u>No history of trauma or strain immediately preceding symptoms</u>	
			<u>Number</u>	<u>Percentage</u>	<u>Number</u>	<u>Percentage</u>
Full Duty	14	29.8	20	66.7	25	69.4
Zone of Interior	26	55.3	0	0	0	0
Limited Duty	3	6.4	3	10.0	4	11.1
Psychiatric Center	0	0	7	23.3	6	16.7
No information	4	8.5	0	0	1	2.8
TOTALS	47	100.0	30	100.0	36	100.0

(*Excluding 9 patients on whom no definite diagnosis was made.)

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